#3268

K-25
Mercury

John Cardarelli NIOSH ~~Lang~~ ? ~~Watkins~~ → Elliott

513-841-4468
513-841-4462

@K25 RP. 4-8263

~~8~~ 7:30A - 4P OR Jackson Plaza
1-4392

K-25 Hg ↑↑

Jennifer says she's seen
100 lbs of Hg

Milton Stanley
historian

Elm Patrick Lipford
→JKL Pat Turin Bldg. 1037 ~~[illegible]~~

SRD '79-'81 ← AXLIS

have 2 1991 ones

His questions:

1. Q-cleared? Y
2. evidence that workers were exposed IH back to 1943-62

part of case cntl study 134,000
coding that now records
for all
chemicals
~~Chemrisk~~ letter to Skonka one of
about boxes w/ envir release info. (TCE
Hg
Cathy Kistoviak benz
dust)

? K-33 bldg.
"where all Hg was at K-25"

Y-12 late 60's

theft ongoing operation outside Harriman in Roane Cnty.
duPont Smith was ringleader
attorney general knows, inspector general
request "FOI"
weight inspector in old transformers

Susan M. Flack

time period?
who info. told?
electromagnetic
transformers?
(size of transformer?)

duPont
Smith

use to estimate
lbs of Hg we're
talking about?

interview others?

- The reduced amount of concrete used in solidifying the waste was believed to have caused the material to leak out of the hydrofracture and into the monitoring wells. Later, the researchers found that the bentonite clay was detrimental to cement formation. (Wyoming bentonite is a sodium bentonite and the sodium is detrimental to the settling of the cement.) It was after this injection that the monitoring wells displayed contamination.

18. What were your primary responsibilities at K-25? 1951-1957

- MS's first assignment at K-25 was assisting the operator in the sanitary water treatment plant (water came from Clinch River near the Gallaher Bridge). After coming to work at ORNL and from experience with the Clinch River Studies, MS often wondered about the water quality at K-25. In 1986 or 1987, Sr^{90} was found in the water supply at the site, so potable water had to be hauled in to K-25.

- MS later worked in the Nitrogen Plant, Fluorine Generation Plant at K-25, mercury distillation, and other operations. The mercury distillation operation resulted in considerable spillage of mercury. Mercury was brought onto the loading docks in one liter plastic bottles. The mercury made the plastic brittle, so when they were moved, the bottles broke. The mercury was allowed to run down the loading docks or flushed into the storm drains, which emptied into a pond outside the building (north end). This pond is located near Poplar Creek.

- When mercury was being detected in fish, MS recalls telling Dan Nelson that this area described above, might be a point source. However, it was determined that mercury was coming from another source - Y-12.

- MS indicated that this pond was the site of mercury distillation and fluorine generation in 1953 or 1956 (conflicting information). Large releases of mercury from this building were possible.

- Sealand also indicated that pipe nipples from Chem Tech Division were received at Building 3504. These nipples were supposed to contain mercury, but many of the nipples were empty because the mercury had leaked out. He recalls seeing personnel cleaning a concrete pad outside 3504 where mercury had leaked out of capped pipe nipples along the pipe threads.

19. Do you recall anything about the agriculture of Oak Ridge during your early years at the plants?

- In 1951-1952, the primary agricultural source of milk was Broad Acre Dairies in Knox County. Another large dairy, Mayfield, was located in Athens, TN. MS indicated that there were probably 15-20 small local dairy farms, where the families consumed there own milk.

- MS indicated that some of the farmers may have shipped some of their surplus milk to larger dairies. There were also some apple and peach orchards in the area.

- Sealand also indicated that Health Physics had a program for sampling milk from local farm for study (50 mile radius of Oak Ridge). MS believes that data was obtained from Crossville to Athens, TN. The data may be in one of the Health Physics Division Annual Reports.

10-29-1996 02:19PM FROM ShonkaResearch Assoc. TO 9-13039398318 P.01

K-1024: ERDMC

ER008491
ER025458 Diluting Plant

K-1303:
ER033638 Hg Distillation Facility

K-1420:
ER025307 Hg Room
ER005565
Colex:
ER004003
A-2 (R Turner)

Susan M. Flack

FAX COVER SHEET

SHONKA RESEARCH ASSOCIATES, I
4939 Lower Roswell Road, Suite 106
Marietta, Georgia 30068
Phone: (770) 509-7606
Fax: (770) 509-7507

TO: Sheila Thornton

FROM: Deldy Shonka

DATE: 10/29/96

NO. OF PAGES: (excluding cover page) 7

DOCUMENT: Document Request Forms (6)

COMMENTS: Susan Flack has requested copies of the following documents. They may be in the few documents Jennifer requested out of the 102 documents she reviewed at the ERDMC but Jennifer doesn't remember any specific Hg documents

cc Susan

Original to follow: ___ yes ✓ no

Fax Number 423 5767662

Please let me know if you need any additional information. Please send the documents directly to Susan. Thank you.

TOTAL P.01

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Susan Flack — Requestor

ERDMC (Colex related) — Document Center (is requested to provide the following document)

Date of request 10/29/96 Expected receipt of document ASAP

Document number ~~ER004003~~ Y/TS-626 Date of document

Title and author (if document is unnumbered) ~~+ Jim Riddle notes~~ ~~+ Be box log from HSEA~~

(This section to be completed by Document Center)

Date request received 10/31/96

Date submitted to ADC

Date submitted to K-25 HSA Coordinator 10/31/96

Y-12 HSA Coordinator 10/31/96

(This section to be completed by HSA Coordinator)

Date submitted to CICO

Date received from CICO

Date submitted to ChemRisk/Shonka and DOE

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

* Steve - This is on the email message I sent you today * 10/31/96

CC: Susan Flack

To: Steve Wiley

This is a Y-12 document which requires processing through Y-12. Please handle and submit document to Susan.

SWiley 10/31/96

ChemRisk Repository Number: 4005 Document Number: DOE / OR / 02 - 1370 & D1
Title: "Record of Decision for Lower East Fork Poplar Creek"
Authors: Jacobs ER Team (for DOE Office of Environmental Restoration and Waste Management
Abstract: This document provides the Environmental Restoration Program with information about the selected remedy for East Fork Poplar Creek, which involves excavating floodplain soil with mercury concentrations > 400 ppm and disposing of the soil at a landfill at the US DOE's Y-12 Plant.
Reviewer: Reed, E. W.

Document Publication Date: 05/95

Classification Category: UNC

Primary Document Category: ew
Secondary Document Category: hw
Date Entered: 11/14/95 Entered By: SMG
Keywords: mercury, sediment contamination, soil contamination, water contamination, remedial action, floodplains
SEN, we have a copy.

ChemRisk Repository Number: 2107
Title: "Central Safety and Health Committee Meeting Minutes 1947 - 1949"
Authors: Dunlap, A. P., Richardson, W. L., Henry, H. F.
Abstract: This is a compilation of monthly central safety and health committee meeting minutes. The minutes report the industrial hygiene activities, health physics activities, and safety activities. The descriptions of activities are in very general terms; however, they do cover air monitoring activities and radiation survey instruments. The report on industrial hygiene activities includes air analysis reports for fluorides, hydrogen fluoride, fluorine, mercury, trichloroethylene, carbon tetrachloride, ammonia, carbon monoxide, nitrous oxide, nickel, phosgene, lead, plutonium, silica and uranium. The health physics section discusses the air, water and stream bottom sampling programs.
Reviewer: Lamb, J. K.
Document Source or Location: K-25 Site Records Center Box 12-2-5-28
Document Publication Date: 1947 - 1949
Data Time Period - Start: 1947
Data Time Period - Stop: 1949
Classification Category: UNC
Site Document Addresses: K
Primary Document Category: hs

Date Entered: 11/16/95 Entered By: SMG
Keywords: health physics, industrial hygiene, sediment, Poplar Creek, air, water, safety
ALA, we have a copy.

ChemRisk Repository Number: 2111 Document Number: KZ - 1278
Title: "Distillation, Drying, and Testing Purity of Hg"
Authors: George, J.
Abstract: A procedure used at K-25 for the distillation, drying and testing the purity of mercury. The document does not give any indication of the reasons for purifying the mercury.
Reviewer: Lamb, J. K.
Document Source or Location: K-25 Site Records Center

Classification Category: UNC
Site Document Addresses: K
Primary Document Category: hs

Date Entered: 11/16/95 Entered By: SMG
Keywords: mercury
ALA, we have a copy.

ChemRisk Oak Ridge Repository Listing 12/14/95

ChemRisk Repository Number: 2114 Document Number: K / EM - 139 K / EM - 99 K / EM - 137 K / EM - 145 K / EM - 136 K / EM - 143 K / EM - 140 K / EM - 138 K / EM - 132 K / EM - 139
Title: "Extract of K-25 Plant Quarterly Report for Fiscal Quarters January 1, 1949 - March 31, 1951"
Authors: Carbide and Carbon Chemicals Division, Union Carbide
Abstract: These documents represent the first seven volumes in the quarterly reports produced by the K-25 site. Generally, the documents are divided into sections A-J. The sections include: Fiscal Activities, Production, Engineering and Maintenance, Health and Safety, Industrial Relations, Research and Development, SF Accountability, Combined Operations (Information about work done for or with other AEC sites). The information contained in each of these sections varies by quarter, but the most relevant areas to the dose reconstruction include: Production of U-235; Abnormal Operations; Material Usage; Purge Cascade Operation; Auxiliary Material Production; Decontamination and Recovery; Health Physics Activities; Radiation and Contamination Levels; Air Survey Program; Water and Stream Bottom Survey Program; Industrial Hygiene Activities: uranium, mercury, fluoride, plutonium, and chlorinated hydrocarbons; Material Balance; and Inventory.
Reviewer: Lamb, J. K.
Document Source or Location: K-25 Site Records Center

Data Time Period - Start: 01/01/49
Data Time Period - Stop: 03/31/51
Classification Category: UNC
Site Document Addresses: K
Primary Document Category: HO

Date Entered: 11/16/95 Entered By: SMG
Keywords: usage, consumption, decontamination, recovery, purge cascade, health physics
SHO, we have a copy.

ChemRisk Oak Ridge Repository Listing 12/14/95

ChemRisk Repository Number: 2122
Title: "Responses to Findings of the Department of Energy (DOE) Headquarters Environmental Survey"
Authors: Marcus, S.
Abstract: A draft copy of responses that were compiled to respond to findings enumerated in the DOE Headquarters Environmental Survey. The document presents the findings and then provides a response to each finding. The findings are concerned with the oil and solvent drum storage yard, mixed waste (depleted uranium chips), mercury contaminated ground water, the Bear Creek Valley Waste Disposal Area, thorium contamination on the south side of building 9201-5, the potential for uncontrolled, unmonitored atmospheric release or uranium through non process room exhausts, the drum storage yard, location of stack samplers, and a variety of other problems.
Reviewer: Lamb, J. K.
Document Source or Location: K-25 CEP
Document Publication Date: 05/21/87

Site Document Addresses: Y
Primary Document Category: Ed

Date Entered: 11/16/95 Entered By: SMG
Keywords: uranium, mercury, polychlorinated biphenyl, Bear Creek Valley ALA, we have a copy.

ChemRisk Repository Number: 2125
Title: "J-1004L Air Analyses Folder 1954-1962"
Authors: Stoddard, D. L.
Abstract: Indoor air sample results for various chemical and radionuclide substances. The table gives the building or area location (in this case all samples were in the K-1004L laboratory), the date of the sample, the sampling time, the contaminant, the analytical result, and any observations or remarks. Chemical contaminants reported include: fluorine, chlorine trifluoride, mercury, uranium, lead, and hydrogen fluoride.
Reviewer: Lamb, J. K.
Document Source or Location: Box 12-2-5-27
Document Publication Date: 1962
Data Time Period - Start: 1954
Data Time Period - Stop: 1962
Classification Category: UNC
Site Document Addresses: K
Primary Document Category: sa

Date Entered: 11/17/95 Entered By: SMG
Keywords: air monitoring, mercury, fluorine, chlorine trifluoride, uranium, K-1004L

ChemRisk Repository Number: 2145 Document Number: A - 3680
Title: "Report of Trip to the Medical Section, Rochester, New York"
Authors: Ketcham, N. H.
Abstract: Describes a visit by a K-25 industrial hygienist to the Medical Section of Union Carbide and Taylor Instruments. The report discusses the status of tests on gas, service, and combat masks; a discussion of medical aspects of uranium fluorides; and a visit to Taylor Instrument Companies to observe the method of Protecting Personnel from Mercury Vapor.
Reviewer: Lamb, J. K.
Document Source or Location: K-25 Site Records Center
Document Publication Date: 01/31/47

Classification Category: UNC
Site Document Addresses: K
Primary Document Category: hs

Date Entered: 11/20/95 Entered By: SMG
Keywords: mercury, uranium hexafluoride, ventilation

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

J. Lamb / 1034A

Requestor — Document Center (is requested to provide the following document)

Date of request 8/18/95 Expected receipt of document 9/15/95

Document number K2-1278 Date of document none

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 8/24/95

Date submitted to ADC 8/30/95

Date submitted to HSA Coordinator 8/24/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 8/30/95

Date received from CICO 9/6/95

Date submitted to ChemRisk/Shonka and DOE 9/6/95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

ChemRisk Document No. 2111

F.L. Roche or George

Distillation, Drying and Testing Purity of Hg.

Genaral:

Most Mercury that comes in the laboratory for treatment, contains substances which effect its use as a reagent therefore it is necessary to follow the outline as here-after described, in order that those foreign substances which effect its actions as a reagent may be removed.

Procedure:

1. Initial Wash

Take 25 lbs of impure or contaminated ~~Hg. Place in 1500 or 2000~~ cc container and wash by passing Hot H_2O through the Hg for at least 4 hrs. depending upon the amount of organic or other foreign substances present . Note; (In case oils are present, this time should be increased to 6 hrs.). The hot water which is passed through should be at such a rate as to break the surface tension of the Hg. This is best obtained by allowing the water to pass through a glass tube and released under the surface of the Hg near the bottom of the bottle or container.

2. Mercury and Water Separation

After completing #1, decant the water above the Mercury and remove all possible water which is on surface, by the use of a vacumm useing a trap to collect the water.

3. Removing amalgams and Acid Neturlization

Take the Mercury from No 2 and pass it through a 30 to 40 cm. tube containing 8% HNO_3. Then through a tuve of the same size containing distilled water. These solutions should be changed after passing through 10 lbs of Hg. The rate at which the Hg is passed through these solutions should exceed not 5 lbs per hour.

4. First Drying (Drierrite method)

The Hg from No 3 is passed over a tube containing Drierite. The tube should be form 12 to 14 Ml. in diameter and 30 cm. in lenght. Place glass wool at top and bottem of Drierite column so as to insure diffusion of Mercury allowing a greater surface to be exposed. The Mercury level sholuld be kept at 3 to 5 cms. above the upper glass wool mat. The Mercury should not passq from Drierite tube faster than 5 lbs. per hour. The Drierite should be changed after passing 30 lbs of Hg through the column. Note: (The Mercury should not contain more than 0.3 of 1% of water by weight. See No. 7 for test.)

5. Distillation of Mercury

The Mercury from No. 4 is placed in the open top reservoir of still. (See figure 106, page 685, Analytical Chemistary. Treadwell and Hall, Vol2, Quantitative, 9th, English Edition.) Make sure that the distance from the Mercury level in the reservoir is 75 cms, lower than the upper level of the Hg in the distillation flask. (Distillation flask should be $\frac{1}{2}$ full.) The center tube, or condensation tube which is to receive the Mercury vapors, should always extend 1 cm. above the Mercury level in the distillation flask. CAUTION: These distances vary according to the barometric pressure and the amount of heat applied to the distillation flask. At least 5 cms. should be allowed from the top of the Hg in the reservoir, allowing for pressure caused by Hg when heat is applied, and also any changes in barometric reading.

The lower condensation tube, or center tube, should be at least 82 cms in length, measuring from the bottom of the open top Hg reservoir to the outlet arm of the Hg seal flask, at the lower end of center or condensation tube. (Note: Center or condensation tube should extend to within ½ cm. of the bottom of the Hg seal flask, (Lower flask). To begin distillation, connect vacuum pump to outlet of Hg seal tube (lower receiving flask), and pull the Hg by vaccum to the desired level in the distillation flask, (half full). (1 cm. below the upper end of center or condensation tube). When level is reached add Hg to the open top reservoir bringing the Hg to the calibrated level. Often it is necessary to add small quantities of Hg while vacuum pump is in operation in order to bring Hg to desired level in distillation flask.

Now a small flame is started under distillation flask. (CAUTION: This should be watched constantly, so that the flame is not too high, causing back pressure on the open Hg reservoir, causing the same to overflow.) Under heat the Hg may rise to 1 to 2 cms. inthe reservoir but never higher. The vacuum pump remains in operation until the Hg seal flask is filled to within ½ cm. of the outlet arm. Now close the bottom screw clamp, disconnect the vacuum pump, and allow the distilled Hg to rise to not less than 50 cms. in the condensation or center tube. Then open the screw clamp slowly and place receiving vessel beneath outlet arm of Hg sealing flask and allow Hg to continum.

6. Final Drying (H_2SO_4 Method.)

The Hg from 5 is placed on electric hot plate under hold. Connect to vacuum with trap between vacumm and Hg container. Dry air is introduced to Hg container using a glass tube extending to the bottom of the container, in order to prevent bumping. The air is dried through conc. H_2SO_4 with a trap between the acid and the Hg. This process is allowed to continue for 4 hours at 180 to 200 degrees F. Remove and allow to cool and strain through 4 layers of clean gauze.

7. Test for Moisture Content.

A5 cc. sample of Hg from No. 6 is shaken out with 25 cc. of alcohol which is an aliquote portion of a 500 cc. sample on which a blank has been run, using Fishers reagent. Decant the alcohol, measure and titrate with Fishers reagent. The amount of water present should not exceed 0.01% by weight. (Note: In case Hg contains a higher percentage of moisture retumn and repeat No.6.

8. Qualitative Test for Metal Radicals.

The principal impurities found in Hgare: Copper, cadmium, zinc, and some times silver and gold. These substances are tested for as outlined in Langes Handbook Of Chemistery, 4th addition, Page 946. Should any of the above be present, repeat No. 3 through 7 inclusive. (Note: Increase HNO_3 used in No. 3 to 10%.

9. Labeling and Accounting of Reagent Mercury

The Hg from No. 8 is labeled (Distilled and Dried Hg.) Moisture content, date prepared, and quanity or weight. The Hg is tightly stoppered and stored, and shall be accounted for as prescribed by chief chemist in charge.

J George

DSF'd

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

J. Lamb / 1634A

Requestor — Document Center (is requested to provide the following document)

Date of request 8/18/95 Expected receipt of document 9/15/95

Document number K-I-2808 Date of document 1/25/54

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 8/24/95

Date submitted to ADC 8/30/95

Date submitted to HSA Coordinator 8/24/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 8/30/95

Date received from CICO 9/6/95

Date submitted to ChemRisk/Shonka and DOE 9/6/95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

ChemRisk Document No. 2203

Out

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. J. R. McGuffey, K-1029

LOCATION Mechanical and Structural Engineering

DATE January 25, 1954

ANSWERING LETTER DATE

ATTENTION

SUBJECT BELLOWS FAILURES IN K-29 SIX INCH G-17 VALVES

KLI-2808

COPY TO
Barkow, C. W.
Barnett, H. L.
Barton, J. C. ✓
Batch, R. M.
Bollinger, E. C.
Chambley, W. B.
Clouse, R. J.
Cromer, S.
Eastman, F. B.
Ellis, J. M.
Fuller, R. M. (Paducah)
Grable, G. B. (Goodyear)
Green, C. H. (Paducah)
Gritzner, C. L.
Gritzner, V. B.
Hamer, W. J.
Kimmerly, E. Y.
Lang, D. M.
Levin, R. W. (Paducah)
Mahoney, C. H.
Maier, R. V.
Milone, C. R. (Goodyear)
Mull, B. D.
Olson, R. C.
Parsons, J. A.
Savage, H. W. (Paducah)
Schussler, M.
Schwenn, M. F.
Shaffer, R. D.
Snyder, H. G. P.
Vanstrum, P. R.
Williams, D. E.
Winkel, R. A. (Paducah)
Lab. Central Files K25RC (2)

Introduction

The failed bellows from two 6 inch G-17 valves which failed in K-29 in the newly installed process gas piping have been examined. These valves were from a group of 30 units recently withdrawn from Stores for installation. History of these units was unavailable because some of the valves had had previous plant service and maintenance prior to their withdrawal from Stores.

Upon removal of the valves, appreciable amounts of mercury were found in the system. The mercury was reported to have entered the system during vacuum testing at an absolute pressure of about 2 microns. The failures of the bellows were detected during vacuum leak testing and reportedly occurred on three valves which had been cycled several times during the testing procedure. These valves were located at a low point in the piping system where the mercury tended to collect.

The bellows from the two valves were submitted for examination to determine if the failures were attributable to the presence of mercury in the valves.

Conclusions

The bellows, identified spectrographically as brass (81% copper, balance zinc), failed because of stress-corrosion cracking as evidenced by the intergranular path of the failures. The cracking propagated from the inner surface of an outer convolution on one of the failed bellows and from the inner surface of an inner convolution on the other bellows. The inner surfaces also showed dezincification.

The exposure of the bellows to mercury had only occurred on the outer surface of the valve bellows assembly. Therefore, it is concluded that the failures of these bellows were not caused by the presence of the mercury in the system but were the result of stress-corrosion attack from previous exposure of undetermined origin prior to installation.

The literature states and laboratory tests demonstrated that mercury and mercury compounds are capable of producing stress-corrosion cracking in brass; therefore, the presence of mercury in this system is undesirable.

Procedure, Results and Discussion

The failure locations were found by hydrostatically testing the bellows assemblies. The failures in both bellows occurred in the lower section of the assemblies (nearest the valve seat). Samples were taken from the failure areas in the sections and were examined metallographically. Both failed bellows revealed intergranular cracks originating from the inner surface of the bellows. The path of the cracks, as revealed in the first and second valve bellows examined, are shown in figures 1 and 2, respectively. Figure 1 shows cracks originating from the inner surface of an inner convolution while figure 2 reveals similar cracks originating from the inner surface of an outer convolution. Both surfaces of the bellows, but particularly the inside surface, showed a pitting type of attack with spongy deposits of copper which is indicative of a dezincification type of attack. The reported cycling of the valves during the leak testing probably induced stresses sufficiently great at regions of maximum motion to allow stress-corrosion cracks, that may have already existed or may have developed at dezincified locations in the bellows during cycling, to penetrate the bellows wall.

A test was conducted in which the outer surface of a brass bellow was exposed partially immersed to metallic mercury and to mercury vapor in an evacuated dessicator. The brass bellows was maintained in highly stressed condition during the test. This procedure produced failure of the bellows within a period of a few hours exposure. Although the bellows failures examined in this investigation were not due to the mercury found in the system it should be recognized that the presence of mercury is undesirable since mercury and mercury compounds readily induce stress-corrosion failure in stressed brass.

D. S. Napolitan

M. Schussler

Trouble Shooting
Metallurgy Department
Technical Division

DSN:MS/ib

Figure 1

INTERGRANULAR PATH OF THE FAILURE

Plate 2177, Sample 5800, 500X, Chromic Etch

This photomicrograph illustrates stress-corrosion cracking which is evidenced by the intergranular path of the failure from the inner surface of an inner convolution. Also shown is the deposition of copper resulting from a dezincification attack of the brass. This sample was taken from the lower section of the first valve failure examined.

Figure 2

INTERGRANULAR PATH OF FAILURE

Plate 2203, Sample 5919, 500X, Chrome Etch

Stress-corrosion cracking originating from the inside surface of an outer convolution of the bellows. This bellows sample was taken from the second valve failure examined.

[redacted]

UNCLASSIFIED

Serial C-60
File Index
Date October 30, 1946

CLINTON ENGINEERING WORKS

CARBIDE AND CARBON CHEMICALS CORPORATION

~~RESTRICTED~~

Laboratory Division

Works Laboratory Department

SUMMARY REPORT OF THE NATURE OF THE CHEMICAL CONTAMINANTS FOUND IN THE ATMOSPHERE IN THE K-25, K-27, AND FERCLEVE AREAS

N. H. Ketcham

R. H. Rainey

Rep. No. 804

NHK
F.W.
RHR

UNCLASSIFIED

Robert H. Lafferty
Chemical Technical Ass't. Dept. Head

Frank W. Hurd
Works Laboratory Dept. Head

Summary Report of the Nature of the Chemical Contaminants Found in the Atmosphere in the K-25, K-27, and Fercleve Areas.

This report has been prepared with the specific objectives of (1) showing what chemical atmosphere contaminants are encountered in different locations, and (2) indicating in general which of these contaminants are of greatest potential hazard.

Except as indicated, the data represents air which operating personnel breathe for significant periods during a working day. An effort has been made to delete any data which was obtained with a particular objective such that the analysis would not be representative of a normal exposure condition.

Most of the locations covered in the report are currently being given routine periodic sampling. Such a location is identified by the final date of September 9, 1946 in the line showing the period covered. If the final date is given as prior to September 9, 1946 the location is merely being observed occasionally to detect any change in operations which might warrant reopening a sampling schedule.

Changes in operating procedures and production equipment in many areas have resulted in lower analyses at the present time than the averages shown for the periods covered by the report.

In cases where a location has been sampled fifty times or more for a particular contaminant a percentage breakdown of the data is given. If less than fifty samples were taken it appeared that a percentage breakdown might be misleading.

The reader is cautioned not to draw from the data any specific conclusions regarding the extent of health hazard in a given location. Only the medical department, which is familiar with many details that could not be included in this report is properly qualified to draw such conclusions.

Section C. Contaminant Mercury Vapor

Building 1024, Room 13 Wing, Instrument Repair

Period Covered: January 7, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg		(209)
Number of analyses of less than 0.1 mg. Hg/cu. meter	45%	(95)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	55%	(114)

One operation (no longer conducted in the original manner) caused the immediate area to contain as high as 17 mg. Hg/cu. meter of air.

Building 1024 , Room 4 Wing, Instrument Repair

Period Covered: May 17, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg	(34)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(31)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(3)

Mercury Recovery - Conditioning Building Laboratory

Period Covered: December 12, 1945 through December 21, 1945.

Total number of air samples analyzed for Hg	(23)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(0)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(23)

The above 23 analyses averaged 0.3 mg. Hg/cu. meter

Mercury Recovery - 1401 Building and 1301 Building

Period Covered; January 29, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg		(60)
Number of analyses of less than 0.1 mg. Hg/cu. meter	43%	(26)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	57%	(34)

Mercury Recovery - Building 1004-D, Rooms 11 and 12.

Period Covered: August 1, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg	(28)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(10)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(18)

Building 1004-D, All Rooms Handling Mercury Regularly

Period Covered: December 11, 1945 through September 9, 1946.

Total number of air samples analyzed for Hg	(45)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(36)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(9)

This data does not include the Mercury Recovery Operations in Rooms 11 and 12.

Building 1004-C Rooms 261 and 265.

Period Covered: June 3, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg	(40)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(18)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(22)

Building 1004-C, Room 207

Period Covered: May 21, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg	(24)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(24)

Miscellaneous Process Areas

Period Covered: May 2, 1946 through September 9, 1946.

Total number of air samples analyzed for Hg	(10)
Number of analyses of less than 0.1 mg. Hg/cu. meter	(8)
Number of analyses of 0.1 mg. Hg/cu. meter or greater	(2)

FAX

COVER SHEET

SHONKA RESEARCH ASSOCIATES, INC.
4939 Lower Roswell Road, Suite 106
Marietta, Georgia 30068
Phone: (404) 509-7606
Fax: (404) 509-7507

TO: S. FLACK

FROM: YOUR FRIEND FLICKA

DATE: 7/12/95

NO. OF PAGES: 3
(excluding cover page)

DOCUMENT:

COMMENTS: Mercury-related info @ K-25

Fax Number (303) 939-8318

1443

File

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. W. C. Moore
LOCATION Technical Service Section
Building K-1401

DATE March 29, 1946

ATTENTION

ANSWERING LETTER DATE

COPY TO Mr. C. L. Stewart
Mr. F. E. Smothers
File

SUBJECT Mercury Stills

A report from the Industrial Hygiene Department of the Laboratory Division shows that the mercury vapor concentration in the vicinity of the mercury stills in the furnace room of Building K-1401 was consistently higher than the maximum toxic limit for prolonged exposure. The Laboratory survey was made during the period from January 29 to February 7, 1946.

Mr. F. E. Smothers and the undersigned conferred with Mr. M. L. Brown of your department on March 22 on the subject of precautions to be taken when operation of these stills is resumed.

1) It was agreed that the exhausts from the vacuum pumps on the stills should be manifolded and piped to the outside of the building.

2) It was also agreed that a rigorous program of housekeeping with regard to mercury should be instituted. Spills should be cleaned up immediately and thoroughly. An industrial type vacuum cleaner is recommended.

3) In view of the fact that the equipment has been modified since the Laboratory survey was made, it is thought that suggestions number 1 and 2 outlined above represents only preliminary steps, and the final recommendations will be made only after a re-survey of the Hg concentration has been made in the vicinity of the stills in their new locations.

JHBull
J. H. Bull
Technical Engineer

Reviewed by: Claude L. Stewart
Claude L. Stewart
Chief Safety Engineer
Safety Department

JHB:hjs

Central Safety

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. G. A. Jamieson
LOCATION K-1401

DATE July 6, 1949

ANSWERING LETTER DATE

ATTENTION
COPY TO J. S. Lyon, M. D.
Mr. A. F. Becher
File

SUBJECT Industrial Hygiene Air Sampling. (See "Mercury K-1401 Vacuum Pump Sh. Ind. Hyg. Report, AA-2168 dated 6-27-49)

Dear Mr. Jamieson:

Recent highly positive atmospheric mercury determinations made on the inside of the shoes worn by the personnel in the Vacuum Pump Shop are, to some extent, coincident with urinary evidence of mercury absorption. There is no clinical evidence of damage sustained from exposure to mercury by any of the persons concerned, even though the urinary mercury findings have been in the range of the maximum acceptable rate of excretion, above which one might expect to find some damage.

It is the opinion of the Medical Department that all "Contaminated" shoes should be replaced and a study of the problem initiated. The maximum acceptable level of contamination is yet to be established; however, on the basis of available data, the following initial working standard is suggested: When a shoe has an inside atmospheric mercury contamination equal to or exceeding 0.08 mg Hg per cubic meter, it is to be considered "Contaminated" and ready for exchange.

Since an increase in the number of mercury contaminated parts to be processed in the Vacuum Pump Shop is expected in the near future, it is suggested that all the personnel be examined monthly for urinary mercury. These persons are to be checked as nearly as possible during the same period in which their shoes are examined for atmospheric contamination.

It is hoped that these tests, over a period of several months, will lead to a proper evaluation of the situation so that suggestions of a more permanent nature may be made.

Yours very truly,

D. L. Stoddard

D. L. Stoddard
Industrial Hygienist

DLS/mw

Approved by: J. S. Lyon
J. S. Lyon, M. D.
Asst. Medical Director

Internal Distribution
6-28-49 JEC
Rep. No. 807

RESTRICTED

Approved for Issue by: R. W. Bahler for Frank W. Hurd Report No. K-112 - Part 1
Date of Issue: December 15, 1947

PRD-1

CLINTON ENGINEER WORKS

CARBIDE AND CARBON CHEMICALS CORPORATION

Works Laboratory

PRODUCTION REPORT OF THE INDUSTRIAL HYGIENE SECTION

OCTOBER AND NOVEMBER, 1947

N. H. Ketcham

DISTRIBUTION LIST

Cy. 1., 2. A. P. Dunlap
3. Works Laboratory Central File
4. A. G. Kammer, M.D.
5., 6. N. H. Ketcham

Table III

Air Analyses

October and November, 1947

Contaminant			
	Total Number of Samples	Number of Samples Containing 0.00 mg U / cu meter	
Uranium	26	26	
	Total Number of Samples	Number of Samples Containing Less Than 0.1 mg Hg / cu meter	Number of Samples Containing 0.1 mg Hg / cu meter, or Greater
Mercury	129	114	15*
	Total Number of Samples	Number of Samples Containing Less than 100 ppm	Number of Samples Containing 100 ppm or Greater
Trichloroethylene	47	38	9*
	Total Number of Samples	Number of Samples Containing Less Than 1 ppm	Number of Samples Containing 1 ppm or Greater
Fluorides (as HF or F_2)	5	4	1*
	Total Number of Samples	Number of Samples in Which No Combustibles Detected	Number of Samples in Which Combustibles Detected, but not in Explosive Concentrations
Combustibles	15	11	4*

6-15-49 J.E.C.

RESTRICTED

Approved for issue by: Dr. Costello

Date of Issue: ~~December 19, 1947~~

Jan. 19, 1948

Report No. K-112, Part 2

CARBIDE AND CARBON CHEMICALS CORPORATION

K-25 PLANT

OAK RIDGE, TENNESSEE

Medical Department

INDUSTRIAL HYGIENE LABORATORY ANALYSES

DECEMBER, 1947

By N. H. Ketcham

CLASSIFICATION CHANGED TO OFFICIAL USE ONLY
By authority of D.S. Napolitan 5-6-70
By M. Phillips Date 5-11-70

DISTRIBUTION LIST

1 and 2 ... Dunlap

3 and 4 ... Baker

5 M. J. Costello, M. D.

6 A. G. Kammer, M. D.

7 T. E. Lane

Appendix (Item 3) to Report of Health Physics Activities for December, 1947.

COPY

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TABLE I

INDUSTRIAL HYGIENE AIR SAMPLING

DECEMBER, 1947

Air Samples for Uranium Analyses

Total number of samples	13
Number of samples containing 0.00 mg.U/cubic meter	11
Number of samples containing greater than 0.15 mg. U/cubic meter	2*

* Both of these samples were taken in room 21, Building K-1004-D approximately 30 minutes after a UF_6 leak had occurred on December 30, 1947.

Air Samples for Mercury Analyses

Total number of samples	59
Number of samples containing less than 0.1 mg. Hg./ cubic meter	49
Number of samples containing 0.1 mg. Hg/ cubic meter, or greater	10*

* Five of these samples were taken on December 2, 1947 in room 63, K-1004-A. A mercury spill had occurred the preceding day. Clean up efforts were being made. One of these analyses represented atmosphere in a mercury storage area, room 72, K-1004-A. Four were obtained in room 215N, K-1401.

Air Samples for Trichlorethylene Analyses

Total number of samples	30
Number of samples containing less than 200 ppm	24
Number of samples containing 200 ppm or greater	6*

* These analyses were obtained at working positions around the K-1401 Building Cleaning Area degreasing tank and Pump Shop degreaser. Exposure time of any one man is limited and intermittent, hence the data is not considered indicative of any significant exposure.

Air Samples for Dust Counts

Total number of samples	6
Number of samples containing less than 5 MPPCF	5
Number of samples containing greater than 5 MPPCF	1*

* For experimental purposes, this sample was taken in the K-1069 Sand Blasting Shop, immediately following a blasting operation. Protective equipment is worn by personnel doing sand blasting.

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO	Mr. E. B. Olszewski	DATE	February 16, 1948
LOCATION	K-1004-D	ANSWERING LETTER DATE	
ATTENTION			
COPY TO	✓M. J. Costello, M. D., K-1003 R. A. Walker, K-1037	SUBJECT	Building K-1037

104.8

Arrangements are currently being made with Mr. R. A. Walker to schedule an air sampling program in certain restricted areas within the K-1037 Building. In anticipation of this work, it will be appreciated if arrangements are made by the Works Laboratory to obtain the necessary security approval to have the required laboratory personnel enter these restricted areas. It is understood that the request for security approval should be directed to the Plant Protection Division with a copy to Mr. R. A. Walker.

N. H. Ketcham

N. H. Ketcham
Industrial Hygienist
Medical Department

NHK :hsp

Lunette
File

wcx-80

THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

Box # 12-2-5-28

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Jennifer Lamb
~~[illegible]~~ / K-25 Site Records

Requestor — Document Center (is requested to provide the following document)

Date of request 3/22/95 — Expected receipt of document 4/7/95

Document number ________ Date of document 1947-1949

Title and author (if document is unnumbered)

Central Safety and Health Committee Folder (meeting minutes)

~~Please copy the entire folder~~

(This section to be completed by Document Center)

Date request received 3/27/95

Date submitted to ADC 3/29/95

Date submitted to HSA Coordinator —

(This section to be completed by HSA Coordinator)

Date submitted to CICO 3/29/95 6/13/95

Date received from CICO 4/28/95

Date submitted to ChemRisk/Shonka and DOE 6-26-95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received ________

Signature ________

ChemRisk Document No. 2107

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 PLANT
OAK RIDGE, TENNESSEE

CENTRAL SAFETY COMMITTEE MEETING MINUTES

July 20, 1948

Attendance:	Mr. W. B. Humes	Dr. F. W. Hurd
	Mr. A. P. Huber	Mr. J. P. Murray
	Mr. C. A. Babcock	Mr. J. B. Scott
	Mr. R. M. Batch	Mr. D. H. Riley, Jr.
	Dr. C. K. Beck	Mr. J. J. Fritz
	Mr. S. Cromer	Mr. B. Speyers
	Mr. A. P. Dunlap	Mr. R. R. Wolf
	Mr. J. A. Elkins	Mr. F. R. Dowling (AEC)
	Mr. H. R. House	Mr. A. F. Becher
	Mr. J. J. McCarthy	
Absent:	Mr. W. L. Richardson	

The meeting was called to order at 10:00 a.m., by Mr. W. B. Humes, Plant Superintendent, and the minutes for the June meeting approved as written.

OLD BUSINESS

Safety Award Plan--The Safety Department reported that certain sample awards had been received and others are expected at the end of the week, at which time they are to be submitted to a subcommittee for selection of those which are to be approved by the superintendents' group. Discussion as to which employees would be eligible for receipt of such awards followed, and it was agreed that only those employees who were on the pay roll for some portion of the period during which the record was established would be eligible.

Rescue Squad Training--Mr. Dunlap reported that two complete shifts have been orientated to date and training is proceeding according to schedule. Training headquarters have been completed and the committee appointed to carry on this phase of the program is proceeding with further plans including field practice sessions for handling special hazards.

Plant Air and Water Sampling Program--Mr. Dunlap reported that the committee had held an initial meeting to discuss the over-all program for air, water and mud sampling for the K-25 Plant, and work was continuing to coordinate all phases of this program.

Accident Reporting Procedure--Messrs. Wolf and Dunlap reported that the committee had met and agreed in general on the proposal as submitted, and it was expected that with certain modifications, the procedure would be completed shortly and recommendations of the committee submitted at an early date for approval.

Eckes

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 PLANT
OAK RIDGE, TENNESSEE

CENTRAL SAFETY COMMITTEE MEETING MINUTES
September 30, 1948

Attendance:	Mr. W. B. Humes	Mr. H. R. House
	Mr. A. P. Huber	Dr. F. W. Hurd
	Mr. R. M. Batch	Mr. J. J. McCarthy
	Mr. C. A. Babcock	Mr. J. P. Murray
	Mr. S. Cromer	Mr. W. L. Richardson
	Mr. A. P. Dunlap	Mr. D. H. Riley, Jr.
	Mr. J. A. Elkins	Mr. B. Speyers
	Mr. J. J. Fritz	Mr. R. R. Wolf
	Mr. G. S. Hensley	Mr. A. F. Becher
Absent:	Dr. C. K. Beck (Vacation)	

The meeting was called to order at 10:05 a.m. by Mr. W. B. Humes, Plant Superintendent, and the minutes for the August meeting were reviewed and approved.

OLD BUSINESS

Safety Awards--The Safety Department reported that the following orders had been placed on September 15 and delivery expected within two weeks; however, later advice from the Purchasing Department indicates that delivery will be made by October 15, 1948:

1583 Color King Pens (S. Buchsbaum Company, Chicago, Illinois)
1733 Billfolds (S. Buchsbaum Company, Chicago, Illinois)
1280 Zippo Lighters (Zippo Manufacturing Company, Bradford, Pa.)

Rescue Squad Training--The status of this program was reviewed by the Safety Department, and it was reported that all squads had completed the following:

a. First Aid Review, transportation of injured and artificial respiration.

b. Mask training, use of Chemox, All Service and U. S. Assault Masks, in simulated field conditions.

c. Fundamentals of fire fighting apparatus, hose and ladder evolutions and use of salvage covers.

The remainder of the year 1948 will be devoted to classroom discussion of special hazards. This will include a general review of toxic and radioactive materials and flammable liquids used at the plant. Squad members will be made familiar with the use of various types of detection instruments, the location of hazardous materials and the proper method of handling in case of emergency. Field practice sessions will be put into effect during January 1949 to provide simulated field conditions of emergency wherein the squads will respond to practice rescue tactics, etc. It is expected that initial training and certification of the squads will have been completed by March 1949.

NEW BUSINESS

Device for Removing Mercury Vapor from Vacuum Cleaner Exhaust--Laboratory Report No. K-272 was reviewed by the committee. It was recommended that a sufficient number of vacuum cleaners be equipped with this type filter for plant use. The Safety Department will follow this and recommend use at locations where mercury is handled.

Injury Analysis and Record--The General Maintenance Division, which until recently had experienced the greatest number of injuries in the plant, has now improved this performance and exceeded its best previous record of forty-one days. As of September 30, it has completed eighty-three days of operation without experiencing a major injury. Other divisions which have bettered their best previous record and are continuing to operate without experiencing major injuries are: Industrial Relations, 632 days, Plant Engineering, 783 days, Electrical Maintenance, 332 days, and Superintendents, 244 days.

Mr. Dunlap reviewed the relationship of major to minor injuries and directed the attention of the committee to the continued trend of causative factors of minor injuries contained on Page 4 of the August report.

Make-up Pay Policy--Mr. Humes reviewed a recent case where he had settled the question of make-up pay in favor of the employee because the supervisor, although aware of the accident, failed to refer the employee to the dispensary for treatment at the time of the accident. He emphasized the importance of each supervisor's questioning an employee following an accident (when an injury may not be immediately apparent) as to whether the employee was hurt and to assure himself in all doubtful cases by referring the employee to the dispensary.

Foreman Accident or Injury Reports, When Required; and Employee Statements to Medical Attendants--A discussion of this subject centered around the advisability of direct questioning of employees by Medical attendants when the cause of an injury is unknown to the employee or seemingly not job connected. Mr. Riley felt that many minor irritations, not necessarily job connected, etc., were blamed on fly ash at the Power House simply because the employees may have been present in areas where fly ash might be encountered. Mr. Humes suggested that Dr. Lyon attend future meetings of the Central Safety Committee as a regular member so that the Superintendent can better appreciate the problems of the Medical Department. It was also suggested that early discussions between the foreman or supervisor and the physician would help the Medical Department in its diagnosis. In addition, the subcommittee handling the proposed accident reporting procedure was requested to submit its final recommendations at the next meeting.

Powder Activated Stud Drivers--Mr. Speyers reviewed the plant experience involving the use of the Tempotool. He pointed out that accidents resulting from the use of the tool seemingly balanced the time savings involved in its use. He further stated that use of the tool had recently been limited to only those persons who were properly trained and that in cooperation with the Safety

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 PLANT
Oak Ridge, Tennessee

Carbide and Carbon Chemicals Corporation Operating Contractor for the U.S. Atomic Energy Commission.

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
February 15, 1949

Attendance:

C. A. Babcock	H. R. House
R. M. Batch	A. P. Huber
C. K. Beck	W. B. Humes
S. Cromer (Represented by G. A. Garrett)	F. W. Hurd
A. P. Dunlap	J. J. McCarthy
J. A. Elkins	J. P. Murray
J. J. Fritz	D. H. Riley, Jr.
G. S. Hensley	B. Speyers
	R. R. Wolf
√ A. F. Becher	W. L. Richardson
J. S. Lyon	S. Visner

Mr. W. B. Humes, Plant Superintendent, opened the meeting at 10:05 a.m.

Correction of January Minutes

The name of the Committee should have been "Central Safety and Health Committee" in keeping with enlarged scope of the Committee.

Old Business

Identification of Radiation Hazards--The subcommittee appointed to study this matter was announced as follows: Messrs. J. A. Elkins, B. Speyers, J. P. Murray, A. P. Dunlap, and Dr. F. W. Hurd. This subcommittee will meet February 16, at 2:00 p.m., in Mr. Dunlap's office.

Emergency Passes--The "M" symbol previously proposed for identification of supervisory personnel has been deemed unnecessary and will not be used.

New Business

Accident Experience, February, 1949--Mr. Humes reviewed the safety record established by Plant employees and commented on its excellence, particularly for the past three months, during which time only three major injuries occured and the frequency rates were 1.30, 1.21, and 1.29, respectively, for November, December, and January. The total number of injuries reported during the month of January was 232, as compared to 358 for the same month a year ago and 320 for the previous month. This represents a considerable reduction, provided all injuries are being reported. Twenty-three minor injury reports had not been received by the Safety Department on the seventh of the month (four working days), and it was requested that more attention be given to promptness in reporting. There was no significant change in motor vehicle accident experience as far as type or seriousness of accident was concerned. One accident involved personal injury when a vehicle skidded and overturned on the Power House road. There were two minor fires reported, and monetary loss was insignificant. There were no property damage accidents reported during the month. Results of the following personal accident investigations were reviewed:

Case (Reference Non-tabulatable Major Injury No. 43½)

This case involved an alleged injury of an employee, which occurred on November 28. Subsequent investigation revealed that the divergent allegations made by the employee

2. Similarly when employees are referred by the Dispensary to outside doctors the Medical Department (not supervision) should make sure that the consultant understands the history of each such case and the Plant policy of returning employees to suitable work, which can be performed without endangering the employee.

3. In determining whether or not a lost time injury should be taken on the Plant accident record, it is only necessary to determine whether or not the employee is able to perform a regularly established job in the Plant, which is open and available to him.

Review of Industrial Hygiene Activities

Dr. Lyon reviewed work done during January concerning air samples taken to check on Plant environment conditions affecting health. Results were in general negative involving checks for mercury, uranium, nickel, hydrogen fluoride, nitrous oxide, and trichlorethylene. Dr. Lyon also reported the results of urinalysis work. The group unanimously agreed that this type information is very much desired, and in the future Dr. Lyon will present to the group significant information which relates laboratory results directly to specific Plant areas involved.

The question was raised as to whether or not the Oak Ridge water was being treated with fluorides to prevent tooth decay. It was generally agreed that this might be a good place to try out such an experiment in view of the highly favorable results from same elsewhere. Dr. Lyon mentioned that one beryllium check was made and that the results were negative. There is no tolerance set on this metal, and present practice is to use as a basis 1.005 milligrams per litre.

Dr. Beck raised the question as to whether or not the Medical Department advised the employee of urinalysis findings in each case. Dr. Lyon said that they did not in any case on the first check; however, if the second check still shows up, they sometimes do. Dr. Lyon feels that to tell an employee would only unnecessarily alarm him and would serve no useful purpose.

Supervisory and Employee Questions on Cancer

Mr. Dunlap mentioned that there were numerous questions arising from employees as to whether or not a cancer may result from working in the plant. Dr. Beck said that even the lowest concentration of uranium has its effect on the body, but that it is not necessarily the forerunner of cancer. He mentioned that he had read a report recently which showed a definite correlation between skin cancer and temperature. This survey demonstrated that skin cancer is more prevalent in Southern cities where the temperature is higher than in Northern cities. It is also evident that continued abrasion of the skin has in certain cases produced cancer.

A P Dunlap

A. P. Dunlap, Superintendent
Safety and Inspection Division

WLR:ec

cc: Mr. C. E. Center
Mr. S. R. Sapirie (2)

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
March 8, 1949

Attendance:

C. A. Babcock
R. M. Batch
C. K. Beck
S. Cromer (represented by G. A. Garrett)
A. P. Dunlap
J. A. Elkins
J. J. Fritz
H. R. House
W. B. Humes
J. S. Lyon
J. J. McCarthy
J. P. Murray
D. H. Riley
B. Speyers
R. R. Wolf
General Foreman (4) (Represented by W. H. Taylor)

A. F. Becher
W. L. Richardson
S. Visner

Absent: F. W. Hurd

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, K-25 Plant Superintendent, at 10:10 A. M.

OLD BUSINESS

Correction of February Minutes

1. The tolerance figure which is tentatively being used for beryllium should have been 0.005 Mg/l instead of 1.005 Mg/l. (See review of Industrial Hygiene Activities, page 3).

2. The report mentioned by Dr. Beck showing a correlation between skin cancer and temperature should have been recorded in the minutes as sun radiation instead of temperature, (see page 3, Supervisory and Employee Questions on Cancer).

NEW BUSINESS

Fluorine north of K-1401 Building

Dr. C. K. Beck reported a strong odor of fluorine was noticeable at times in in the north end of K-1401 Building and inquired whether or not the Medical Department had ever taken any air samples at a time when the odor was noticeable to determine if a hazard existed. Dr. Lyon reported that none had been taken to his knowledge. Mr. Humes was of the opinion that purging of amounts sufficiently heavy to be readily smelled should be discontinued. Messrs. Murray and Garrett were requested to check all operations using fluorine especially in the area north of K-1401 to eliminate insofar as practical to do so the possibility of releasing this toxic material.

Emergency Vehicle Right-of-Way

The Safety Department reported that a disregard of the right-of-way for emergency vehicles has been noted on numerous occasions. Mr. Humes requested the committee members to call attention to this in their safety meetings and instruct all vehicle operators to pull over and stop when in the path of emergency vehicles.

Alpha count on one hundred thirty-six (136) samples were made; one hundred thirty-one (131) were negative. Five (5) showed some activity. These were on individuals from Engineering Development Division and Uranium Control Department. All analysis were below a level where clinical damage may be observed.

Eighty-five (85) analysis for fluoride were made, all of which were below the maximum allowable concentration of 2 mg/l.

Twenty (20) analyses for beryllium on Fairchild employees were observed to be below the 0.005 level.

Two (2) analysis for lead - negative.

Two (2) analysis for Pu - Lab. J. employees - negative

Air Analysis

Mercury - Of the one hundred sixteen (116) air samples taken, all were below the maximum allowable concentration except five (5) samples taken in Labs. A, B and C:- 1 - result of a spill; 4 - mercury in an oven vaporized.

Uranium - all below MAC
Monomer - K-413 Building, all below MAC
Nitrous Oxide - Five (5) samples were taken, one of which was over the MAC. This was found in the decontamination chamber following removal of a tube bundle.

Hydro-carbons - All negative except occasional high readings noted at degreasing unit in K-1401 Special Shops Department.

HF - Of the four (4) samples taken, one was noted above the MAC. This occurred in the K-1303 Building during a decontamination operation.

Health Physics Activities

Mr. S. Visner reported on Health Physics activities for the month, summarizing results as follows:

Air, Water and Mud Survey Program

Continuous air samples were taken in seventeen (17) locations during the month. In most cases these samples were taken on a daily basis; however, in some instances samples were of jobs and other special spot samples that were of approximately six hour duration. Fourteen (14) cases of above tolerance air samples were reported. The above tolerance samples may be divided as follows:

K-1405 - Five (5) due to vibrator reactor near spray tank
K-1410 - Five (5)
Cylinder Head Repair Shop - Two (2)
K-1024 Building - One (1)
Cascade Service Jobs - One (1) A. C. Pump cleaning

In all cases the above tolerance activity can be attributed to specific operations which have been proven by spot samples to be a source of high air contamination and therefore, respiratory protective equipment is used by the operating personnel at these times.

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
April 12, 1949

Attendance: R. M. Batch, C. K. Beck, E. C. Bollinger, S. Cromer, A. P. Dunlap, H. R. House, W. B. Humes, A. P. Huber, F. W. Hurd, J. J. McCarthy, J. P. Murray, D. H. Riley, B. Speyers, R. R. Wolf, J. S. Lyon, Plant General Foreman (Represented by G. S. Hensley) (4)

W. L. Richardson, A. F. Becher, S. Visner, H. F. Henry

Absent: J. A. Elkins, J. J. Fritz

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, K-25 Plant Superintendent, at 9:55 A. M., April 12, 1949. The minutes for the March meeting were approved as written.

I. OLD BUSINESS

None.

II. NEW BUSINESS

A. Industrial Hygiene Activities - Discussed by Dr. J. S. Lyon

Urinalysis

One hundred sixty-one (161) analysis for uranium were made, the results of which were all below the level associated with damage. Twelve (12) analysis involving nine (9) employees revealed traces of "U". Three (3) were picked up during periodic health re-checks involving employees in Process, Maintenance, Engineering Development, and Laboratory Divisions. Seven (7) were attributed to persons being in the vicinity of a material release. These occurred in the Laboratory and Maintenance Divisions. All of the above results were negative on follow-up sampling results with the exception of two (2) in the Laboratory Division. Recall results on these are not available as of this date.

Alpha Count

A total of one hundred thirty-seven (137) analysis were made during the month of March, one hundred thirty-two (132) of which were below the tolerance value of 2 c/m/100 ml. The remaining five were over the tolerance level; however, on follow-up visits, two cases were below 2/c/m/100 ml. Recall results on the remainder not available at the present time. One case involving a Laboratory worker with high findings was the result of a material release; however, subsequent follow-up results were below the tolerance figure.

Two (2) air samples for "U" were taken in Room 09, K-1004-D, one of which was in excess of 0.15 mg/cu.m. for uranium based upon its chemical toxicity. Employees involved have been instructed to wear approved respirators while handling "U" on this operation.

Mercury

A total of twenty-five (25) analysis for mercury were made, twenty-two (22) of which were below 0.1 mg/ HG/liter; two (2) were in a range between 0.1 and 0.2 and one was in excess of 0.2 mg Hg/liter. The conditions previously reported on mercury exposure in the Vacuum Pump Shop have quieted down and it is expected that with the provision of gloves for this operation future exposures will be minimized. Continued evidence of mercury exposure on the case carried over from last month was attributed to a medicine being used by the employee rather than being the result of his work.

Fifty-four (54) air samples for mercury vapor were taken during this period, all of which were below the maximum allowable concentration of 0.1 mg/cu.m.

Fluoride

Ninety-four (94) analysis for fluoride were made during this period; eighty-nine (89) of which were below 1.0 mg F/liter. Four (4) were in the range between 1.0 and 1.5, and one in excess of 1.5 mg F/liter. The above involved employees in the Maintenance, Process, and Laboratory Divisions.

Fourteen (14) air samples were taken in the K-413 Building in the Polymerization Room for trifluorochloroethylene. Only two of the fourteen results were less than the maximum limit of 10 ppm.

Action Taken - Due to the frequency of samples in the K-413 Building above the maximum allowable concentration value of 10 ppm used by the K-25 Plant, Messrs. Murray and Lyon were requested to study the operations involved to determine whether additional ventilation should be supplied as well as to check into the maximum allowable concentration figure established by the plant and the analysis methods being used.

Zinc Oxide

Four (4) air samples for zinc oxide were taken in the Sheet Metal Shop, K-1401. A check of welding operations at a shop table was made due to complaint of employees who reported symptoms characteristic of exposure to zinc oxide. No auxilliary ventilation was provided at this location and air samples taken without ventilation were above the maximum allowable concentration. Subsequent provision of portable local exhaust ventilation has alleviated this problem.

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES

May 10, 1949

Attendance: Mr. R. M. Batch
Dr. C. K. Beck
Mr. E. C. Bollinger
Mr. S. Cromer
Mr. J. A. Elkins
Mr. J. J. Fritz
Mr. H. R. House
Mr. W. B. Humes
Mr. A. P. Huber
Dr. F. W. Hurd
Dr. J. S. Lyon
Mr. J. J. McCarthy
Mr. D. H. Riley
Plant General Foreman (Represented by D. H. Rader) (4)
Mr. J. P. Murray
Mr. W. L. Richardson
Mr. A. F. Becher
Dr. H. F. Henry

Absent: Mr. A. P. Dunlap
Mr. R. R. Wolf

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:05 A. M., May 10, 1949. The minutes for the April meeting were approved as written.

I. OLD BUSINESS

A. Trifluorochloroethylene Exposure, K-413 Building

1. Mr. J. P. Murray reported that additional exhaust facilities had been provided for the primary and secondary stills in the K-413 Polymerization Room and a vacuum chamber was being provided for dumping the still. In addition, a program of leak testing the entire system to minimize leakage is going forward.

2. A re-call schedule is being set-up in cooperation with the Medical Department to review possible physiological effects of frequent exposure to employees in this area.

B. Hand Decontamination

1. Dr. H. F. Henry reported that a soap dispenser provided with a tag indicating they are to be used for hand decontamination are presently available in Stores, and that a mixture of 80% SBS-11 and 20% soda by weight, was available in bag lots. Cost of the dispensers is approximately $5.00, and the mixture approximately .70¢ per bag, which will provide a filling of a dispenser about one and one-half times.

2. Experiments indicate that hands may be as well decontaminated by 10% soda solution as by a higher percentage, the above mixture therefor should provide sufficient soda to do the necessary decontamination. It should be pointed out that there is evidence that washing the hands with soap alone tends to fix uranium rather than remove it in some cases. The use of the

6. He reported further that during the month of May there were nine motor vehicle accidents experienced with an estimated loss or damage of $200.00 associated therewith. This type of accident continues to be a major factor requiring concentrated effort on the part of all concerned to further minimize recurrence. Frequency rate to date indicates an increase over the previous years experience.

7. There were five property damage accidents with a total of $345.00 damage associated therewith, and five fires involving a loss or damage in the amount of $75.00.

8. Mr. Richardson announced May 8th - 14th as the week set aside for the Plant Spring Clean-Up Campaign. The program for the plant includes:

a. Material for the use of plant supervision which lists the type of predominant factors and ignition sources for plant fires;

b. Lists of questions and answers on fire safety;

c. Self-Inspection Committees are to be appointed by the Division Superintendent concerned who will conduct an inspection of plant facilities;

d. Locker Inspection - A program to cover all plant lockers to check for possible sources of fire hazards as well as contamination and to preclude employees using out of date equipment such as gas mask canisters, and respirator filters has begun.

B. Industrial Hygiene Activities - Discussed by Dr. J. S. Lyon

1. Dr. Lyon reported that Mr. D. L. Stoddard of the Laboratory Division had been transferred to the Medical Department where he will serve as Industrial Hygienist for the Plant. He replaces Mr. W. H. Baumman who has been serving on a part time basis.

2. Urinanalysis - One hundred forty-four analysis for uranium were made, one hundred thirty-eight of which were negative, and six indicated traces of uranium. There were two positive urines on re-calls. The remaining four involved three employees of the Process Division who were in the vicinity of a material release and one laboratory employee in the vicinity of a material release. For the first time in plant history all employees checked on the Industrial Health Re-Check schedule came through with negative results.

3. Alpha Count - A total of one hundred forty-seven analysis were made during the month of April, one hundred forty-one of which were less than 2/c/p/m; of the four remaining analyses, only one was above 3/c/p/m level. These involved employees in the Laboratory, Engineering Development and Process Divisions.

4. Mercury - One positive urinary sample was obtained during this period involving a maintenance employee. Of the ninety-six samples, all were below the maximum allowable concentration.

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
June 14, 1949

Attendance:	Mr. R. M. Batch	Mr. W. B. Humes
	Dr. C. K. Beck	Mr. J. J. McCarthy
	Mr. E. C. Bollinger	Mr. J. P. Murray
	Mr. S. Cromer	Mr. D. H. Riley, Jr.
	Mr. A. P. Dunlap	Plant General Foreman (Represented by Mr. A. A. Forseman) (4)
	Mr. J. A. Elkins	Mr. R. R. Wolf
	Mr. H. R. House	
	Dr. J. S. Lyon	Mr. W. L. Richardson
	Dr. H. F. Henry	Mr. A. F. Becher
	Mr. O. W. Bernheim	
Absent:	Mr. J. J. Fritz	Dr. F. W. Hurd
	Mr. A. P. Huber	

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:02 A. M., June 14, 1949. The minutes for the May meeting were approved as written.

I. OLD BUSINESS

A. Sanitary Water Treatment - Dr. F. W. Hurd

Action on the above was postponed until the next meeting due to the absence of Dr. Hurd from the plant.

B. Radiation Monitoring at Tool Crib Issue Points

Dr. H. F. Henry reported that a satisfactory procedure had been worked out with the tool cribs whereby all equipment handled by the K-303-4 Tool Crib is monitored and contaminated items are separated from non-contaminated items and processed in accordance with plant procedure. The tool crib at the K-1401 Building conducted spot checks on items handled by them. Results of an overall survey on 3,000 individual items indicated only seven were contaminated. This item is considered to be under control at the present time.

C. Charge Against Using Departments for Items of Protective Equipment

Mr. J. A. Elkins reported that a study of the procedure followed for the issuance and control of all items of personal protective equipment did not reveal a practical means for charging to using departments. He indicated the major difficulty connected therewith was the re-issue of used items to many departments and that he knew of no equitable method for distributing costs. It was the consensus of the group that no further action should be taken; however, spot checks should continue from time to time to assure that equipment is not misused.

II. NEW BUSINESS

A. Industrial Hygiene Activities - Discussed by Dr. J. S. Lyon

1. Uranium - During the month of May three positive urinary findings were recorded on the plant, one of which involved an employee who was in the vicinity of a material release; two were picked up on industrial health re-checks. Clinical examinations revealed no damages associated therewith.

2. Alpha Count - One positive alpha count which was below the threshold limit was picked up on industrial health re-checks involving an Uranium Control employee.

3. Air samples taken during the month were below the threshold limit established for uranium based upon its chemical toxicity. Positive results were obtained in the K-1024 Building during a transmitter dismantling operation; one in Room 12, K-1004-D, as a result of a material release and one in the K-131 Building.

4. Fluorides

a. Four positive urinary findings were recorded on employees during routine industrial health re-checks. These involved three employees in the fluorothene manufacturing area and one in the Process Maintenance Department. One of the above exceeded the normal urinary excretion rate for this type of material. Dr. J. S. Lyon reported that careful study was being made of the involved employees in the K-413 Building and if urinary findings remained below 2/mg/F/L, consideration would be given to raising the threshold limit for this type of exposure.

b. Air analysis taken in the Polymerization Room, K-413 Building, indicated 50% of the total were below the maximum allowable concentration with a high peak of 166 ppm and the remainder being below 30 ppm. Protective equipment was worn during operations where high results were obtained.

5. Hydrogen Fluoride - All samples taken during the month were below the maximum allowable concentration.

6. Carbon Tetrachloride - Only two of the samples taken during the month were above the maximum allowable concentration. These occurred in the K-1030 degreasing operation and following installation of plywood covers all subsequent results were below the maximum allowable concentration.

7. Mercury - One positive urinary finding was picked up on routine industrial health re-check. This involved an employee in the Vacuum Pump Shop. An attempt is being made to determine the conditions of the exposure. All air samples taken during the month for mercury were below the maximum allowable concentration.

8. Trichlorethylene - Results obtained on the large degreaser operatio in the K-1401 Building continue to indicate samples at face level in excess of the maximum allowable concentration. It was further reported that ventilation at this facility was as good as could be provided and that the peaks recorded occur during removal of the equipment from the tank. No recommendations to minimize these occurrences were made. Samples obtained

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
July 12, 1949

Attendance:	Dr. C. K. Beck	Mr. W. B. Humes
	Mr. E. C. Bollinger	Mr. J. J. McCarthy
	Mr. A. P. Dunlap	Mr. D. H. Riley, Jr.
	Mr. J. A. Elkins	Plant General Foreman (Represented by
	Mr. G. A. Garrett	Mr. D. H. Rader (4)
	Mr. H. R. House	Mr. R. R. Wolf
	Dr. F. W. Hurd	
	Dr. H. F. Henry	Mr. A. F. Becher
	Dr. J. S. Lyon	
Absent:	Mr. R. M. Batch	Mr. J. P. Murray
	Mr. S. Cromer	Mr. W. L. Richardson
	Mr. A. P. Huber	

The meeting of the Central Safety and Health Committee Meeting was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:05 A. M., July 12, 1949. The minutes for the June meeting were approved as written.

A. Report of Industrial Hygiene Activities - Dr. J. S. Lyon

1. Uranium - During the month of June, five positive urinanalysis were recorded, four of which were results of Industrial Health Re-Checks and one associated with a material release. These involved employees in the Laboratory, Maintenance, Process and Engineering Development Divisions.

Carbide and Carbon Chemicals Corporation Operating Contractor for the U.S. Atomic Energy Commission.

2. Alpha Count

a. The urinary alpha count taken during the period were all below the tolerance value of 2/c/m/100 ml.

b. Air analysis taken at the K-131 and F-631 Buildings were negative.

3. Fluorides

a. Urinary findings in three cases were above 1.5/mg/F/L, two of which involved employees in Fluoroethene Manufacturing and one Instrument Department employee during Industrial Health Re-Checks, and one employee in the Engineering Development Division as a result of a material release.

b. Air samples taken in the Polymerization Room were all below the maximum allowable concentrations.

4. Carbon Tetrachloride - All samples taken were well below the maximum allowable concentrations for this type material, which indicates an excellent job has been done in the K-1030 Building to reduce the levels of air contamination.

5. Mercury

a. Urinary - All findings were below the range associated with damage.

b. Air samples taken were within the maximum allowable concentration.

6. Tricholorethylene

a. Occasionally air samples in the K-1401 Degreaser Units indicated above tolerance levels. The highest levels noted were the result of leaks in the system under the unit. Corrective action is being initiated to repair piping.

b. Air analysis at the K-413 Building were all below the maximum allowable concentrations.

c. Air analysis taken at the K-402-1 Building during degreasing operations on maintenance jobs exceeded the maximum allowable concentration but due to the short interval of exposure, no corrective action is indicated.

7. Hydrogen Cyanide - All samples were negative.

8. Zinc - All samples were below the maximum allowable concentration.

9. Phosgene - All results were negative.

10. Beryllium - All results were negative.

11. Lead - All results were negative.

12. Plutonium - All were within the tolerance level for this type material.

B. Report of Health Physics Activities - Dr. H. F. Henry

1. Overall Radiation and Contamination Levels

a. The overall level of contamination in the plant, as shown by spot audits in various locations, is approximately the same as for the preceding month. Although there are evidences of improved conditions in the K-101 Building, the Process Maintenance Shops, and in various maintenance jobs, there are also indications of higher contamination levels in the K-1301 Oxide Weighing Room, the K-1410 Decontamination and Storage Area, and the K-1410 Tank Room.

b. The overall intensity of penetrating radiation showed a decided increase during the month over the level noted in May. This increase is principally due to several particularly "hot" operations performed in the K-1004-J Radiochemical Laboratory. There was also a slight increase in the radiation level in the Wet Chemistry Section and a small decrease in the K-1301 Electrochemical Section.

tag indicating the contents, date received, person whom assigned, etc. Experience in the past has indicated that some unidentified cylinders have been released from the plant and a recent accident involved the rupture of a cylinder that the Laboratory Division had retained on the storage platform for the past three years without having a proper record made of the contents. The proposal should not only provide for easy identification of the material but will assist in the repairs to and disposal of defective cylinders from time to time, as well as minimize possibilities of improper shipments from the plant.

E. Vacuum Cleaners for Recovery of Mercury Spills

Mr. Dunlap reported that design had been completed for modification of a Kenmore Tank type vacuum cleaner for use in recovery of mercury spills, utilizing hopcalit filter and timing device as previously mentioned. Estimated costs is $245.00. This cost reflects developmental cost incurred for the small number of units which will be required wherein such items as rubber molds, etc. must be included. It was further recommended that three such vacuum cleaners be provided for plant use through the tool crib facilities. This was agreeable to all concerned.

II. <u>OLD BUSINESS</u>

A. Water Treatment to Reduce Beta Activity - Dr. F. W. Hurd

Dr. Hurd reported that the Laboratory Division had made preliminary study of materials and methods which might satisfactorily perform this job; however, no progress had been made to date. The laboratory will continue to study this problem and when positive results are obtained Dr. Hurd will report back to the committee.

B. Treatment of Re-Circulating Water - Dr. J. S. Lyon and Mr. J. P. Murray

In the absence of Mr. J. P. Murray, Dr. Lyon reported that representatives of the Public Health Department, ORO Office of Community Affairs, had made an inspection of the water cooling towers and recommended that samples of the water spray be taken and analyzed. General inspection of the area revealed no evidence of spread of pollution. Any action in this regard will be held pending analysis of the water spray.

C. X-Ray Exposure Records - Dr. F. W. Hurd

Dr. Hurd pointed out that it had been brought to his attention that employees who were receiving x-ray radiation during routine physical examinations were being requested to remove their film badges and he raised the question as to whether or not such exposures were being made a part of the overall radiation exposure record in that it was a type of exposure required by the Company, even though it was normal practice in every day life. Mr. Humes requested Dr. Henry and Dr. Lyon to investigate and determine desirability of including such records

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
August 16, 1949

Attendance:

Mr. E. C. Bollinger ✓
Mr. S. Cromer ✓
Mr. A. P. Dunlap absent
Mr. J. A. Elkins ✓
Mr. H. R. House ✓
Dr. F. W. Hurd ✓
Mr. A. P. Huber ✓
Mr. J. J. Fritz ✓

Dr. H. F. Henry ✓
Dr. J. S. Lyon ✓

Mr. W. B. Humes ✓
Mr. J. J. McCarthy ✓
Mr. J. P. Murray ✓
Mr. D. H. Riley, Jr. ✓
Plant General Foreman (Represented by Mr. D. H. Rader) (4) TAYLOR
Mr. R. R. Wolf ✓
R.H. BATCH ✓
W L Richardson ✓
Mr. A. F. Becher ✓
CA BABCOCK

Absent: ~~Mr. R. M. Batch~~ APDunlap

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:03 A. M., August 16, 1949. The minutes for the July meeting were approved as written.

I. REPORT OF INDUSTRIAL HYGIENE ACTIVITIES - Dr. J. S. Lyon

A. Uranium

1. One positive urinary finding was recorded during the month as a result of industrial health re-check on a machine shop employee. Re-call results were negative.

2. Alpha Count - No positive urinary findings were recorded during the report period.

B. Fluorides

1. One positive urinary finding which was less than the threshold limit of 2/mg/F/L. was reported. This involved an employee of the Fluoroethene Manufacturing Area. Air analyses taken during the month on this operation were all below the maximum allowable concentration. Since this time operations have been curtailed due to lessening of requirements.

C. Mercury

1. There were no positive urinary findings during the report period; however, one border line case was reported for an employee of the Maintenance Shops.

2. Air analyses for the month were negative except for one laboratory area where results were obtained in excess of the maximum allowable concentration due to a material release. However, immediate clean-up was effected and subsequent results were negative.

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
September 20, 1949

Attendance:

Mr. R. M. Batch
Mr. E. C. Bollinger
Mr. S. Cromer
Mr. J. A. Elkins
Mr. H. R. House
Dr. F. W. Hurd
Mr. A. P. Huber
Mr. J. J. Fritz

Dr. J. S. Lyon
Mr. C. A. Babcock

Mr. W. B. Humes
Mr. J. J. McCarthy
Mr. J. P. Murray
Mr. D. H. Riley, Jr.
Plant General Foreman (Represented by Mr. W. H. Taylor) (4)
Mr. R. R. Wolf
Mr. W. L. Richardson

Dr. H. F. Henry
Mr. A. F. Becher

Absent: Mr. A. P. Dunlap

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:05 A. M., September 20, 1949. The minutes for the August meeting were approved as written.

I. REPORT OF INDUSTRIAL HYGIENE ACTIVITIES - Dr. J. S. Lyon

A. Uranium

1. There were four positive urinary findings recorded during the month as a result of Industrial Health Re-checks involving two employees of the Chemical Operations Department and two of the Cascade Operations Department. Subsequent re-checks on the above individuals were all negative.

2. Air analyses for uranium during the month revealed six above tolerance analyses obtained; four involving operations in the K-1405 Building, and two in the K-1004-C Laboratory. Employees involved in the operation of K-1405 Area were equipped with respirators, and, in the other case, intermittent exposure resulted from operations within an exhaust hood. Additional exhaust facilities are being considered.

3. Alpha Count

Three positive urinary findings were recorded as a result of Industrial Health Re-check examinations involving employees of the Cascade Services Group.

B. Fluorides

1. No positive findings were recorded during the report period.

2. Hydrogen Fluoride

One over tolerance air sample was obtained in the K-1405 Building, and one on hood operations, K-1004-C Laboratory. Additional ventilation facilities are being considered to minimize this condition.

C. Mercury

1. Three positive urinary findings were recorded as a result of Industrial Health Re-checks taken involving employees of the Engineering Development Division, Instrument Department and Works Laboratory Department.

2. Air analyses for the month were all below the maximum allowable concentration.

D. Trichlorethylene

1. Several high results were obtained following removal of a CWS cylinder from the degreaser in the Special Shops Department.

2. Seven samples in a range of 100 - 200 p.p.m. were recorded for operations in the K-1030 Building; however, these were taken with a Halide Flame Detector and are not comparable with the Davis Micro Gas Analyzer results. A re-check is planned of these operations following repairs to the Davis equipment.

E. Plutonium

All results obtained were well below the tolerance factor.

F. Lead

No positive urinary findings were recorded during the report period.

G. Mr. Humes mentioned that the odor of fluorine near the K-1401 Building has been quite noticeable on occasion and raised the question whether this was attributable to purging of the cascade. Mr. Huber indicated this was probably the case, and that Process Division was presently working on installation of suitable scrubbers for the various exhaust points in the cascade to minimize this condition.

II. REPORT OF HEALTH PHHSICS ACTIVITIES - Dr. H. F. Henry

A. Overall Radiation and Contamination Levels

1. Spot surveys of the plant during the month of August indicate that overall contamination levels are significantly lower than the preceding month. This is attributed to improved conditions in the K-1303 Building, K-1401 Pump and Seal Shop, K-306-6 Product Withdrawl station, and cylinder assembly and test shop. Higher contamination levels were reported for the K-413 Process Laboratory and K-312-3 Maintenance Shop.

2. Levels of penetrating radiation intensities in the plant remain approximately the same as previously reported. However, increased levels were recorded in the K-1301 Oxide Grinding Room and the K-1405 West Room. These were attributed to equipment maintenance in the grinding room and to a change in the type materials being processed in the K-1405 Building. A decrease in intensity levels was recorded in the K-1004-J Radiochemical Laboratory.

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
October 18, 1949

Attendance:	Mr. R. M. Batch	Dr. F. W. Hurd
	Mr. A. F. Becher	Mr. W. B. Humes
	Mr. E. C. Bollinger	Mr. A. P. Huber
	Mr. S. Cromer	Dr. J. S. Lyon
	Mr. A. P. Dunlap	Mr. J. J. McCarthy
	Mr. C. H. Dykes	Mr. D. H. Riley, Jr.
	Mr. J. A. Elkins	Mr. W. L. Richardson
	Mr. J. J. Fritz	Plant General Foreman (Represented by Mr. D. H. Rader) (4)
	Mr. H. R. House	Mr. M. F. Schwenn
	Dr. H. F. Henry	
Absent:	Mr. J. P. Murray	Mr. R. R. Wolf

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:30 A. M., October 18, 1949. The minutes for the September meeting were approved as written.

I. REPORT OF INDUSTRIAL HYGIENE ACTIVITIES - Dr. J. S. Lyon

Dr. Lyon reported that general plant conditions were much improved over the previous month's experience. He stated further that the new two-hour urine sample interval had been put into effect for exposure cases, and it is his opinion that this would work out satisfactorily in the future.

A. Uranium

1. Urinalyses

Nine positive urinary findings were recorded on employees involved in the release in the K-631 Building; one positive finding was recorded for an employee from Plutonium Research, and three positives recorded on employees during Industrial Health Re-Checks.

2. Alpha Count

No positive analyses were recorded for the report period.

3. Air

Three samples above the maximum allowable concentration were obtained at a hood in the Works Laboratory. The employee was not exposed, however, the operation has since been equipped with a plexi-glass shield to provide for better air flow around the hood opening.

B. Fluorides

1. There were no positive urinalyses recorded during the month.

2. Hydrogen Fluoride

All air samples were below the maximum allowable concentration.

C. Mercury

1. Urinary results in one case was a borderline positive.

2. Air analyses were all below themaximum allowable concentration except for four taken adjacent to a vacuum cleaner equipped with a hopcalite filter.

D. Plutonium

All analyses were below the plant tolerance.

E. Beryllium

All analyses were below the plant tolerance.

F. Trichlorethylene

No unusual results were obtained at the degrearer unit; however, high findings were recorded in the pit being excavated for installation of a new degreaser unit, K-1401 Shops. Ventilation and respiratory protection was provided and employees were examined at the Dispensary. No apparent injuries resulted.

G. Nitric Oxide

High samples were obtained at the K-132 Building when the operation was started up under inclement weather conditions. A heavy blanket of fumes were observed, both in and outside of the building; operator and analysts were referred to the dispensary and givenoxygen as precautionary treatment. This operation will not be started up under adverse weather conditions or at night, but will be operated only during clear weather to allow for dissipation of the fumes.

II. REPORT OF HEALTH PHYSICS ACTIVITIES - Dr. H. F. Henry

A. Overall Radiation and Contamination Levels

1. Spot surveys during September reveal a rise in the overall plant contamination level. This is attributed chiefly to contamination as a result of the material release in the K-631 Building, as well as increased contamination at the following locations: K-1301 Electrochemical Laboratory, K-1004-A Sampling Section, K-1004-D Radon Plant; lower levels of contamination were reported for the Coded Chemicals Vaults, K-1401 Basement, and K-1410 Building.

2. An increase in the levels of penetrating radiation intensity were reported in the following locations: K-1004-J Radiochemical Laboratory, K-131 Fresh Feed Room. A decrease was reported for the K-1301 Oxide Grinding Room.

B. Air, Water and Stream Bottom Survey Program

1. Air

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 Plant
Oak Ridge, Tennessee

CENTRAL SAFETY AND HEALTH COMMITTEE MEETING MINUTES
December 6, 1949
for
November and December

Attendance:	Mr. R. M. Batch	Mr. W. B. Humes
	Mr. A. F. Becher	Mr. A. P. Huber
	Mr. E. C. Bollinger	Dr. J. S. Lyon
	Mr. A. P. Dunlap	Mr. J. J. McCarthy
	Mr. J. A. Elkins	Mr. J. P. Murray
	Mr. G. A. Garrett	Mr. D. H. Riley, Jr.
	Mr. H. R. House	Mr. W. L. Richardson
	Dr. H. F. Henry	Plant General Foreman (Represented by
	Dr. F. W. Hurd	Mr. J. B. Scott) (4)
	Mr. G. H. Dykes	Mr. R. R. Wolf
Absent:	Mr. S. Cromer	Mr. J. J. Fritz

The meeting of the Central Safety and Health Committee was called to order by Mr. W. B. Humes, Plant Superintendent, at 10:15 A. M., December 6, 1949. The minutes for the October meeting were approved as written.

I. REPORT OF INDUSTRIAL HYGIENE ACTIVITIES - Dr. J. S. Lyon

Dr. Lyon reported that the following summary is a consolidation of two months' activities, October and November.

A. Uranium

1. Urinalyses

Twelve positive urinary findings were recorded on employees during the report period. Seven were the result of material releases involving five Works Laboratory employees, one Process Division employee and one in Engineering Development Division. The remaining five were picked up on employees during routine Industrial Health Re-checks, involving four employees of Process Division and one in the Process Maintenance Department.

2. Alpha Count

No positive urinary findings were recorded as a result of Industrial Health Re-checks during the month.

3. Air

Air analyses taken in the K-1410, K-131 and K-631 Buildings during the period were all below the maximum allowable concentration.

B. Fluorides

1. Two positive findings

were in a low range inasmuch as findings of 1.5 mg are considered as significant.

2. Hydrogen Fluoride

Air samples obtained in the K-1405 Building were all below the maximum allowable concentration.

3. Fluorine

Fluorine samples from the K-1301 Building were all below the maximum allowable concentration.

C. Mercury

1. There were two positive urinary findings recorded in the K-1037 Laboratory. This condition has persisted for sometime, however, no explanation can be advanced inasmuch as the equipment is maintained in good condition and no spills were recorded. There was one questionable analysis recorded for the Machine Shop Area.

2. Three positive air analyses were recorded during dismantling of equipment in the Barrier Research Department, and five above tolerance recorded for the Laboratory due to spills.

D. Trichloroethylene

Analyses taken at the degreaser operation at K-1401 Building were all below the maximum allowable concentration, however, five samples taken in the pit excavation adjacent to this facility were above tolerance. This work has been completed, and proper precautionary measures were observed during construction.

E. Carbon Tetrachloride

Dr. Lyon reported that a new maximum allowable concentration of 50 ppm has been established by industrial medical authorities, and would be applied in the future as a plant tolerance level. During the report period four analyses in excess of 400 ppm were recorded in the Cascade Services Department; four of the samples obtained in the K-1030 Building were all below the maximum allowable concentration.

F. Ammonia

Seven air samples were recorded above the maximum allowable concentration, however, this condition has been eliminated.

G. Carbon Monoxide

All samples were below the maximum allowable concentration.

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AUG 14 1951
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CARBIDE AND CARBON CHEMICALS CORPORATION

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STANDARD METHOD OF ANALYSIS FOR K-25

J. L. Gabbard
R. H. Lafferty, Jr.
E. Staple

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H. F. Priest
Asst. Laboratory Superintendent

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SAMPLING AND DETERMINATION OF MERCURY VAPOR IN THE ATMOSPHERE

Method:

An atmosphere to be sampled for mercury vapor is drawn through an iodine-potassium iodide solution in a Midget Impinger flask. The analysis of the mercury collected in the iodine solution is made according to the colorimetric method of Polejaeff, modified slightly to meet K-25 requirements. This method is based upon the formation of increasingly intense colored precipitates resulting from the precipitation of mercury iodide on a white cuprous iodide matrix.

Reagents and Apparatus:

1. Iodine solution, 0.05 per cent - Dissolve 0.5 gram iodine and 6.0 grams potassium iodide in distilled water and dilute to a liter.
2. Copper sulfate solution, 10 per cent - Dissolve 15.6 grams cupric sulfate (five water of crystallization) in distilled water and dilute to 100 ml.
3. Sodium sulfate solution, 1 M.
4. Stock mercury standard solution (0.0712 milligrams of mercury per ml.) Dissolve 0.0963 grams mercuric chloride in distilled water and dilute to a liter.
5. Working mercury standard solution - 1 ml. equivalent to 0.5 milligrams mercury per cubic meter air. Dilute 1 ml. of stock mercury to 10 ml. with distilled water.
6. M.S.A. Midget Impinger.
7. M.S.A. Midget Impinger flask, 30 ml., and nozzle

Procedure:

A. Collection: (See Procedure 9.3).

1. Charge a 30 ml. midget impinger flask with 10 ml. of the 0.05 per cent iodine solution.

2. Draw air to be sampled through the solution. Under normal conditions a one cubic foot air sample is taken at a rate of 0.1 cubic foot per minute.

B. Analysis:

1. Set up a series of seven standard tubes as follows:

Standard Series of Mercury Tubes

Test Tube No.	Dilute Mercury Standard - ml.	Distilled Water ml.	Equivalent Milligrams Mercury/cu. meter (5 ml. aliquot used)
1	0.00	1.00	0.00
2	0.10	0.90	0.05
3	0.20	0.80	0.10
4	0.40	0.60	0.20
5	0.60	0.40	0.30
6	0.80	0.20	0.40
7	1.00	0.00	0.50

2. Add 5.0 ml. of 0.05 per cent iodine solution to each of the above tubes.

3. Transfer a 5.0 ml.* aliquot sample from the collection flask to another test tube and add 1.0 ml. of distilled water.

* If an aliquot of less than 5.0 ml. is used, the volume should be brought up to 5.0 ml. with 0.05 per cent iodine solution. Then add 1.0 ml. of distilled water and proceed with steps No. 4, 5, and 6.

4. Add 0.4 ml. 1 M sodium sulfite to both the unknown and the standard tubes. Mix by shaking vigorously.

5. Add 0.2 ml. 10 per cent copper sulfate to both the unknown and the standard tubes. Shake vigorously until the last trace of green color has disappeared.

6. Compare the unknown tube with the standard tubes. Report to the nearest match. Note: The precipitate should be kept thoroughly dispersed during the comparison.

Calculations:

The standard tubes are so graduated that, when 1 cubic foot of air is sampled and a 5.0 ml. aliquot of the iodine is used, the milligrams of mercury per cubic meter is read directly from the standard tube matched.

If other than the above conditions are used, the concentration of mercury may be calculated from the following equation:

$$\frac{1}{A} \times \frac{5}{B} \times \frac{R}{1} = \text{milligrams mercury per cubic meter}$$

Where:

A = volume of air sampled in cubic feet.

B = aliquot of iodine solution analyzed, in ml.

R = equivalent milligrams mercury per cubic meter, as read from standard tube matched.

The Collection and Chemical ~~SAMPLING AND~~ DETERMINATION OF MERCURY ~~VAPOR~~ IN THE ATMOSPHERE

Method:

An atmosphere to be sampled for mercury ~~vapor~~ is drawn by means of a M.S.A. Midget Impinger through an iodine-potassium iodide solution in a MSA Midget Impinger collection flask. The analysis of the mercury collected in the iodine solution is made according to the colorimetric method of Polejaeff, modified slightly ~~to meet K-25 requirements.~~ This method is based upon the formation of increasingly intense colored precipitates resulting from the precipitation of mercury iodide on a white cuprous iodide matrix.

Reagents and Apparatus:

1. Iodine solution, 0.05 per cent - Dissolve 0.5 gram iodine and 6.0 grams potassium iodide in distilled water and dilute to a liter.
2. Copper sulfate solution, 10 per cent - Dissolve 15.6 grams cupric sulfate pentahydrate ~~(five water of crystallization)~~ in distilled water and dilute to 100 ml.
3. Sodium ~~sulfate~~ sulfite solution, 1 M. Dissolve 12.6 grams of anhydrous sodium sulfite in distilled water and dilute to 100 ml. (Make fresh at least monthly)
4. Stock mercury standard solution (0.0712 milligrams of mercury per ml.) - Dissolve 0.0963 grams mercuric chloride in distilled water and dilute to a liter.
5. Working mercury standard solution - 1 ml. equivalent to 0.5 milligrams mercury per cubic meter air. Dilute 1 ml. of stock mercury standard solution to 10 ml. with distilled water.
6. M.S.A. Midget Impinger.
7. M.S.A. Midget Impinger flask, 30 ml., ~~and~~ WITH nozzle. (FIGURE 1, IH-1)

Procedure:

A. Collection of Sample (See Procedure ~~9.5~~ 1H-1) or [illegible].

1. Charge a 30 ml. M.S.A. Midget Impinger flask with 10 ml. of the 0.05 per cent iodine solution.

2. Draw air to be sampled through the solution. Under normal conditions a one cubic foot air sample is taken at a rate of 0.1 cubic foot per minute.

B. Analysis:

1. Set up a series of seven standard tubes as follows:

NOTE: Do not pipette mercuric chloride solutions by mouth. Use a rubber bulb.

Standard Series of Mercury Tubes

Test Tube No.	Working ~~Dilute~~ Mercury Standard - ml.	Distilled Water ml.	Equivalent Milligrams Mercury/cu. meter (5 ml. sample aliquot used)
1	0.00	1.00	0.00
2	0.10	0.90	0.05
3	0.20	0.80	0.10
4	0.40	0.60	0.20
5	0.60	0.40	0.30
6	0.80	0.20	0.40
7	1.00	0.00	0.50

2. Add 5.0 ml. of 0.05 per cent iodine solution to each of the above tubes.

3. Transfer a 5.0 ml.* aliquot of the sample from the collection flask to another test tube and add 1.0 ml. of distilled water.

* If an aliquot of less than 5.0 ml. is used, the volume ~~should be~~ is brought up to 5.0 ml. with 0.05 per cent iodine solution. Then add 1.0 ml. of distilled water and proceed with steps No. 4, 5, and 6.

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4. Add 0.4 ml. 1 M sodium sulfite to both the ~~unknown~~ sample and the standard tubes. Mix by shaking vigorously.

5. Add 0.2 ml. 10 per cent copper sulfate to both the ~~unknown~~ sample and the standard tubes. Shake vigorously until the last trace of green color has disappeared.

6. Compare the ~~unknown~~ sample tube with the standard tubes. (~~Don't do~~ ~~Report to the nearest match.~~) Note: The precipitate ~~should~~ must be kept thoroughly dispersed during the comparison.

Calculations:

The standard ~~tubes~~ are so graduated that, when 1 cubic foot of air is sampled and a 5.0 ml. aliquot of the ~~iodine~~ liquid sample is used, the milligrams of mercury per cubic meter of air is read directly from the standard tube matched.

If other than the above conditions are used, the concentration of mercury may be calculated from the following equation:

$$\frac{1}{A} \times \frac{5}{B} \times \frac{R}{1} = \text{milligrams mercury per cubic meter of air}$$

Where:

A = volume of air sampled in cubic feet.

B = aliquot of iodine solution analyzed, in ml.

R = equivalent milligrams mercury per cubic meter, as read from standard tube matched.

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STANDARD METHODS OF ANALYSIS FOR K-25

J. L. Gabbard
R. H. Lafferty, Jr.
E. Staple

Industrial Hygiene Group

Submitted by:

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Rep.No. 806

Approved for issue by: [illegible]

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Report Number: K-186, Part 1

Internal Distribution
5-19-48 J.E.C.

CARBIDE AND CARBON CHEMICALS CORPORATION
MEDICAL DEPARTMENT
K-25 PLANT

REPORT OF SPECIAL CHEMICAL AND PHYSICAL URINE ANALYSES FOR FIRST QUARTER, 1948

Compiled by N. H. Ketcham

CLASSIFICATION CHANGED TO OFFICIAL USE ONLY
By authority of D.S. Napolitan 5-6-70
By M. Phillips Date 5-11-70

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February

Total number of alpha counts	37
Number of counts below 2 c./min./100 ml.	35
One count of 3.0 ± 0.9 c./min./100 ml.	1
One count of 8.7 ± 1.2 c./min/100 ml.	1

The count of 8.7 ± 1.2 c./min./ 100 ml. was on a specimen from a Maintenance Division employee who had reported to the Treatment Room following a possible exposure in the K-631 Building. That count was accompanied by a chemical analysis of 0.00 mg. U/liter. A "follow-up" count of 0.4 ± 0.7 c./min./100 ml. was obtained. The count of 3.0 ± 0.9 c./min./100 ml. was on an Instrument Division employee specimen previously discussed under part II, February.

March

Total number of alpha counts	89
Number of counts below 2 c./min./100 ml.	88
One count of 2.2 ± 0.9 c./min./100 ml.	1

The count of 2.2 ± 0.9 c./min./100 ml. was obtained as the result of a routine industrial health examination. The "follow-up" analysis was 0.6 ± 0.8 c./min./100 ml. The patient was a Process Division employee.

IV. Mercury Analyses

At the present time an average of 11 persons are routinely examined each week and urine specimens obtained for mercury analysis. Occasionally specimens are taken as a result of treatment room visits. Although a diagnosis of mercury poisoning must be reached on the basis of clinical findings other than urine analysis, the presence of 0.1 mg. Hg/liter, or more, is an indication that some exposure has occurred.

The following urine mercury analysis data was obtained.

January

Total number of analyses	69
Number of analyses of less than 0.1 mg. Hg/liter	62
Number of analyses of 0.1 mg. Hg/liter	6
Number of analyses of 0.2 mg. Hg/liter	1

The seven analyses of 0.1 and 0.2 mg. Hg/liter originated as follows.

Three Works Laboratory employees.
Three Instrument Division employees.
One Research Laboratory employee.

February

Total number of analyses	68
Number of analyses of less than 0.1 mg. Hg/liter	67
Number of analyses of 0.1 mg. Hg/liter	1

The single analysis of 0.1 mg. Hg/liter was on an Instrument Division employee specimen.

March

Total number of analyses	34
Number of analyses of less than 0.1 mg. Hg/liter	33
Number of analyses of 0.1 mg. Hg/liter	1

The single analysis of 0.1 mg. Hg/liter was on an Instrument Division employee specimen.

A further examination of the data shows an interesting trend illustrative of the success of the combined efforts of employees, supervisors and staff personnel in reducing the level of mercury exposure over the past few months.

Month	Percent of Urine Samples Containing 0.1 mg. Hg/liter or Greater
October and November	28%
December	12%
January	10%
February	1%
March	3%

V. Beryllium:

At the present time beryllium salts are being handled or beryllium metal processed at only one location in the K-25 plant. One group in the Research Laboratory dose such work, and the personnel are examined regularly. The examination includes spectrographic urine analyses for beryllium. At present the lack of knowledge concerning the physiological properties of beryllium and its salts precludes reliable interpretation of the urine analysis data.

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CARBIDE AND CARBON CHEMICALS CORPORATION
MEDICAL DEPARTMENT
K-25 PLANT

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By authority of D.S. Napolitan 5-6-70
By M. Phillips Date 5-11-70

REPORT OF SPECIAL CHEMICAL AND PHYSICAL URINE ANALYSES FOR SECOND QUARTER 1948

Compiled by N. H. Ketcham

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Result c./min./100 ml.	Division or Department	"Follow-up" Count
1.7±0.8	Process	0.5±0.7 c./min./100 ml.
2.4±0.9	Process	0.0±0.7 c./min./100 ml.

June

Total number of alpha counts	212
Number of counts below 2 c./min./100 ml.	212

IV. Mercury Analyses

The continued random appearance of urinary mercury in the order of magnitude of 0.1-0.3 milligrams per liter indicates some exposure is still occuring. However, these exposures are of intermittant nature, and evidence of significant chronic exposure is lacking.

The following urine mercury analyses were obtained:

April

Total number of analyses	27
Number of analyses of less than 0.1 mg. Hg./liter	26
Number of analyses of 0.1 mg. Hg./liter	1

The single analysis of 0.1 mg. Hg./liter was on an Instrument Division employee specimen obtained in the course of a routine Industrial Health Examination.

May

Total number of analyses	55
Number of analyses of less than 0.1 mg. Hg./liter	52
Number of analyses of 0.1 mg. Hg./liter	2
Number of analyses of 0.2 mg. Hg./liter	1

The three analyses of 0.1 and 0.2 mg. Hg./liter were on specimens obtained in the course of routine Industrial Health Examinations. The personnel are employed in the following departments:

Two Research Laboratory employees.
One Instrument Department employee.

June

Total number of analyses	54
Number of analyses of less than 0.1 mg. Hg./liter	52
Number of analyses of 0.1 mg. Hg./liter	1
Number of analyses of 0.3 mg. Hg./liter	1

The two analyses of 0.1 and 0.3 mg. Hg./liter were on specimens obtained in the course of routine Industrial Health Examinations. The personnel are employed in the following departments:

One Research Laboratory employee.
One Instrument Department employee.

V. Beryllium

During the second quarter of 1948 the Research Laboratory instituted the use of the spectrographic method of beryllium analysis of the Kettering Laboratory of Applied Physiology, Cincinnati, Ohio. Urinary beryllium is now reported quantitatively to a sensitivity of 0.005 mg. Be/liter (5 ppb). Results in the range 0.001 through 0.004 mg. Be/liter (1-4 ppb) are reported to the Medical Department on a qualitative basis. Lack of knowledge concerning the physiological properties of beryllium and its salts precludes reliable interpretation of the urine analysis data.

The following urine beryllium analyses were obtained:

April (None)

May (None)

June

Total number of analyses	4
Total number of analyses of less than 0.005 mg. Be/liter	4

VI. Plutonium

Starting with June, 1948, a limited number of 24 hour urine specimens, forwarded at monthly intervals to Oak Ridge National Laboratories Health Physics

INTER-COMPANY CORRESPONDENCE

(Insert Name) COMPANY Carbide and Carbon Chemicals Corporation LOCATION Post Office Box P, Oak Ridge, Tennessee

TO Mr. B. Speyers
Mr. J. P. Murray
Mr. S. Cromer
Dr. F. W. Hurd
Dr. C. K. Beck

DATE October 13, 1948

SUBJECT Device for the Removal of Mercury Vapor from the Exhaust of Vacuum Cleaners

104.8

Clean up of mercury spills in the Plant Areas in the past was accomplished by using standard type vacuum cleaners. Analysis made of the exhaust stream from cleaners used in this service revealed over tolerance values of mercury vapor.

Tests to determine a suitable filter to minimize such conditions of contamination were initiated. Report No. K-272, "A Device for the Removal of Mercury Vapor from the Exhaust of Vacuum Cleaners" - W. D. Cline and J. A. Westbrook, dated September 20, 1948, summarizes test data and design specifications for the fabrication of a filter for use with the standard tank type vacuum cleaners.

The above report was reviewed by the Central Safety Committee and the use of such filters recommended in connection with the clean up of mercury spills. One filter has been fabricated and is presently being used by the Instrument Department. Results obtained after six (6) hours of intermittent use are highly satisfactory.

It is recommended that vacuum cleaners used for such service in other Plant Areas be equipped with the new filters. Details of filter design are listed in the report, and the necessary filter material may be obtained from Mr. W. D. Cline, Building K-1004-A.

A P Dunlap
A. P. Dunlap, Superintendent
Safety and Inspection Division

WLR:AFB:mh

cc: Mr. R. A. Walker
Mr. R. M. Williams
Mr. R. A. Wiswall
Mr. K. W. Bahler
Mr. G. T. E. Sheldon
Mr. W. D. Cline
Dr. J. S. Lyon
Mr. A. F. Becher
Mr. W. L. Richardson

4-2-97

To: J. Cockroft
@ ChemRisk
Fax: 510-521-1547

From: S. Flack
@ MHES
Phone: 303-449-8471

3.2.13 Mercury Operations at the K-25 (ORGDP) Site

A small distillation unit used to purify mercury to instrument grade operated at K-25 from 1948-1971 (LaGrone, 1983). Apparently, the operation existed in three different buildings during the period from 1948 until the early 1980s.

See ('s

- Building K-1303 from 1948 to 1956,
- Building K-1024 from 1956 to 1960s,
- Building K-1420 from 1960s to early 1980s.

mid 1950s

Building K-1303

According to a 1995 hazard classification report for Building K-1303 (LMES, 1995), K-1303 provided storage and distribution of gaseous fluorine for the K-25 cascade in 1944. In 1948, the fluorine process equipment was removed and K-1303 became the decontamination facility for process converters from the K-25 building. A uranium recovery, mercury distillation, and oil recovery facility were also installed at that time. The mercury distillation and recovery unit was located within cubicle 2 of the north bay of the building. In 1948 the exhaust system for cubicle 2 was modified to direct and discharge mercury vapors to the atmosphere above the roof of the building. Condensation of mercury on the roof and rainfall runoff could have contaminated the soil around the building (Goddard et al., 1991). Dilute nitric acid used in the mercury distillation/washing process was discharged to the storm drains and contained trace amounts of mercury. This drain system discharged eventually to the K-1407 holding pond (LMES, 1995).

*PhI ref

Several Weekly Progress reports (Preuss, 1947; Hartman, 1948a) and the 1947 Annual report from the K-1300 Area of the Chemical Operations Department (Hartman, 1948b) were located by the project team. For example, the following quantities of mercury were processed in the K-1303 Mercury Recovery Room during the weeks listed below.

February 1-16, 1947	768 pounds

September 6, 1948	160 pounds
September 12, 1948	376 pounds
September 19, 1948	192 pounds
September 27, 1948	360 pounds
1947 Annual total	10,345 pounds

The 1947 Chemical Operations Annual report says that the percentage recovery of mercury was 99%, and small losses result when the triple distilled mercury is dried by passing it through a column of silica gel (Hartman, 1948b).

Building K-1024

A 1991 Remedial Site Evaluation Report (MMES, 1991b) says that Building K-1024 was constructed in 1945 and used for the K-25 site's instrument maintenance shops until 1963 when the shops were relocated. A January 1946 memorandum from the Safety Department to L.L. Forward, Superintendent of the Instrument Division, recommends actions to be taken in the Electronic Shop in Building K-1024 to reduce mercury air concentrations (Bull, 1946a). A November 1946 letter from Bull to Forward says that the mercury vapor concentration has been reduced in the last nine months due to greatly improved housekeeping and improved general ventilation in Room 13 (Bull, 1946b). A January 1947 letter from Bull to Forward includes an attachment prepared by a visiting Industrial Hygienist from Union Carbide which recommends general ventilation changes and installation of a hood for some processes conducted in rooms 13 and 14 of K-1024 that vaporize mercury (Bull, 1947). Minutes from a February 1947 meeting of the Industrial Hygiene Committee (Bemor, 1947) document a discussion of the proposed ventilation changes. The minutes say that the mercury vapor hazard in the Instrument Electronic Shop is almost completely under control due to improved housekeeping practices, and therefore the recommended ventilation changes are unnecessary. A July 1947 memorandum from N.H. Ketcham and F.W. Hurd, Industrial Hygiene Section, to Dr. M.J. Costello, Medical Department, presents the results of air sampling conducted in Room 10 of K-1024 following a mercury spill that occurred in the early morning of June 13, 1947. The quantity of mercury spilled is not reported (Ketcham and Hurd, 1947).

Minutes from a discussion of a paper titled "Summary Report of the Nature of the Chemical Contaminants Found in the Atmosphere in K-25, K-27, and Fercleve Areas" that occurred on September 24, 1946 (Bull et al., 1946) indicates that mercury was used in the following areas:

- Building 1024, Rooms 13, 14 and 4- Instrument Repair (says they repair line recorder tube racks, which involves working with mercury diffusion pumps and unplugging chemical traps containing mercury);

- Buildings 1401 and 1301- Mercury Recovery (says that they have moved out of both locations and the recovery equipment is going to be installed in Building 1303);
- Building 1004-C, Rooms 261 and 265- Instrument Repair (says they are handling mercury diffusion pumps on line recorders).

A report titled "Industrial Hygiene Field Investigations During the First Half of 1948 (August 9, 1948)" includes a summary of locations in which investigations were made during the first half of 1948 (Ketcham, 1948). A table of air analyses for chemical contaminants in May 1948 also shows sampling locations in various buildings (Visner, 1948). According to these two documents, the following locations were routinely sampled for mercury vapor in 1948:

- K-1004-A,-C and -D research laboratories
- K-1024 electronic shop and mercury recovery room
- K-1035 laboratory storage
- K-1037 barrier test room
- K-1095
- K-1303 decontamination room mercury stills
- K-1401 furnace area mercury stills and research laboratory

Results of mercury air sampling in K-1024 in 1961 and 1962 located by the project team indicate that mercury was used in K-1024 at least until October 1962.

Building K-1420

According to a 1987 RCRA Facility Investigation plan for Building K-1420 (MMES, 1987), operations in the K-1420 Mercury Recovery Room during the 1960s and 1970s included cleaning used mercury and recovering it from mercury-bearing wastes using a distillation process. Results of mercury air sampling in K-1420 between 1960 and 1963 located ~~by the project~~ team indicate that mercury was used in K-1420 in the 1950s and early 1960s. (#2237 1958-59) ~~#2239~~ Hg? 1955 No SHO

(Stoddard 1963) #2104

The mercury recovery room was located on the ground floor of the K-1420 building. Mercury contaminated wastes and used mercury were washed with nitric acid and the solutions transferred to the distillation units. A triple distillation process consisting of three stills in series was used to purify elemental mercury by sequential vaporization and condensation. In the third distillation unit, mercury was condensed into a recovery bottle at a purity of 99.9+% and the water decanted. The sink contained a standpipe which prevented mercury from entering the drain at sink level. A floor drain in the center of the room was raised from floor level, preventing most spills from entering the drain line. Spills associated with the distillation units were contained in the curbed area beneath the stills. The effluent from the room's drain lines discharged into the K-1407-B holding pond (Goddard et al. 1991). When the allowable concentration limits for airborne mercury under the National Emission Standards for Hazardous Air Pollutants (NESHAP) changed, the Mercury Recovery Room's ventilation system had to be upgraded to meet the new standard. K-25 management decided not to renovate the exhaust system and the mercury recovery operation was shut down in the early 1980s (MMES, 1987).

In the mid 1960s, 90,000 mercury shipping flasks from Y-12 were cleaned at K-25 and returned to Y-12 for draining Y-12 process equipment. As a result of these cleaning operations, small quantities of mercury were released to Poplar Creek (LaGrone, 1983). A November 1970 document titled "Inventory of Mercury Usage at the ORGDP, 1968- March 1970", says that the ORGDP (K-25) was contracted to recover approximately 1000 pounds of mercury from mercury batteries by a private company during 1968-70 ~~(Herb, 1970)~~.

According to LaGrone (1983), several hundred pounds of mercury were purified per month at the K-25 mercury distillation facility (presumably this is representative of each of the various buildings). This estimate is supported by data located by the project team that shows about 800-1100 pounds were processed per month in 1947 and 1948. However, a total of 6327 pounds of mercury were used and processed by the ORGDP from 1968-March 1970 (Herb, 1970), which is only 230 pounds per month.

See *s

As a result of the distillation operations, mercury was discharged to a holding pond (K-1407-B) that went to Poplar Creek (Goddard et al., 1991). Note that 99% recovery of mercury from the process was claimed in 1947 (Hartman, 1948b). The holding pond was dredged in the 1960s and again in 1973, and mercury contaminated sludge was removed and stored for disposal (LaGrone, 1983). And in 1991, mercury was found in the center floor drain of the K-1420 room, but not in sludge from the K-1407-B holding pond (Baer, 1993). Operating personnel estimate that 1500 *Ph I ref pounds of mercury were lost between 1948 and 1971 (LaGrone, 1983). According to a September 1985 letter from J.G. Rogers to L.W. Long regarding chemical release inventories at the ORGDP, reliable information for developing a mass balance of mercury at ORGDP prior ~~to~~ 1979 is unavailable due to a retention period for purchasing records of only six years ~~(Rogers, 1985)~~. Apparently, the basis for the 1500 pound estimate is described in this letter.

> On June 10, 1983 Mike Mitchell transmitted some information to Tom Scott at USDOE for a press release regarding the mercury balance at the ORGDP. He developed the information by using sampling data at effluent points and flow measurements at the same locations. He calculated that 265 pounds of mercury was discharged from all liquid effluent locations from 1971-1982. By assuming similar activities and release rates for the period from 1948-1971, an additional 600 pounds of mercury were estimated to have been released from ORGDP. Mike Mitchell also estimated that 600 pounds of mercury were lost during the 1960s bottle washing operation [described above]. This results in a total estimate of 1465 pounds of mercury released from the ORGDP from 1948-1982.

The End.

Pers. Commun
in Phase I

Beer 1993

#242
Goddard 1991
*name not in
INMAGIC

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Susan Flack — ERDMC K-1303

Requestor — Document Center (is requested to provide the following document)

Date of request 10/29/96 — Expected receipt of document ASAP

Document number ER033638 — Date of document H 5/K-1303/PK/68.9/R2

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 10/31/96

Date submitted to ADC NA Previously Released 8/30/96

Date submitted to HSA Coordinator 10/31/96

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Date submitted to CICO NA

Date received from CICO NA

Date submitted to ChemRisk/Shonka and DOE 11/4/96

*not in repos.

LMES 1995

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

Document No. HS/K–1303/PK/68.9/R2

Safety Analysis Report Update Program

Hazard Classification for Building K-1303 Air Model Test Facility (Environmental Restoration Site)

September 1995

Prepared by:

K–25 Site Safety, Health and Environmental Review Committee
Lockheed Martin Energy Systems
Oak Ridge, Tennessee

Prepared for the U.S. Department of Energy
under U.S. Government contract DE–AC05–84OR21400

Document No. HS/K–1303/PK/68.9/R2

HAZARD CLASSIFICATION
FOR
BUILDING K-1303 AIR MODEL TEST FACILITY
(ENVIRONMENTAL RESTORATION SITE)

HAZARDS

HAZARD	HAZARD CLASS
Fixed Surface Contamination	Negligible
PCB, Mercury and Uranium Soil Contamination	Negligible

K-1303 Facility Hazard Classification is "Other Industrial."

APPROVALS

C. H. Peterson
Manager, Operations Division
9/28/95
Date

for J. A. Hoffmeister
System Safety Engineering
9/28/95
Date

for L. C. Butler
K-25 Site Facility Safety Manager
9/29/95
Date

J. T. Bradbury III
K-25 Site SHERC Chairman
95-09-29
Date

**HAZARD CLASSIFICATION
FOR
BUILDING K-1303 AIR MODEL TEST FACILITY
(ENVIRONMENTAL RESTORATION SITE)**

M S Sadasivam

M. S. Sadasivam, SAIC
Preparer

9.28.95
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9-28-95
Date

Facility Safety Engineer
Reviewer

9/28/95
Date

CONTENTS

LIST OF FIGURES

1. INTRODUCTION

Department of Energy (DOE) Orders 5480.23[1] and 5481.1B[2] require that a safety review be performed and safety documentation be prepared for all DOE activities where DOE has assumed responsibility for safety. In addition, several DOE Standards have been issued providing guidance concerning facility categorization and/or classification and related safety analysis efforts. In particular, DOE-EM-STD-5502-94,[3] "Hazard Baseline Documentation" provides DOE Environmental Management (EM) guidance on safety and health hazard baseline documents. It has been recognized that the historical safety documentation at the Lockheed Martin Energy Systems (LMES) facilities does not meet the current DOE requirements and guidance in implementing DOE Order 5481.1B and the recent DOE Order 5480.23. To address this concern, LMES has developed and continues to maintain a formal program for the systematic review and update of the existing safety analysis documentation reports. The Safety Analysis Report Update Program (SARUP) consists of the following four phases:

- Phase 0 - Continued Operation Evaluations - Completed
- Phase I - Hazard Classification and Qualitative Analysis - Completed
- Phase II - Quantitative Accident Analysis, and
- Phase III - Complete DOE-Approved SARs

As part of the completed Phase I effort, a hazard screening analysis was performed for selected facilities. This task was performed using input from the Facility Safety Evaluation Team (FSET) in the form of the Preliminary Hazard Screening (PHS) Worksheets. The facilities that could potentially pose significant safety hazards were qualitatively and/or quantitatively analyzed to determine the extent and severity of the hazard. After the initial Hazard Screening document was prepared, changes in both DOE guidance and facility operation revealed a need to revise the Hazard Screening. This revision complies with the classification guidance of DOE-EM-5502-94 and DOE-STD-1027-92.[4]

The K-1303 facility was used for a variety of major operations, including fluorine production, decontamination and recovery of fluorinated lubricating oils, vacuum distillation and recovery of mercury, decontamination of uranium-enrichment process equipment and uranium recovery until 1954 when it was converted to a research and test facility for compressors. All such operations were halted and the building was abandoned in the late 1960s. The Technical Division was responsible for this facility. Now the joint responsibility for this facility rests with the Facility and Property Management Department (F&PM) and Decontamination and Decommissioning (D&D).

The surrounding grounds of K-1303 require F&PM surveillance and maintenance. The site is in the K-1401 operable unit. The Environmental Restoration Division has proposed no further investigation (NFI). If approved by the regulators, the site will be removed from the active surveillance and maintenance (S&M) program after transfer of ownership.

2. SUMMARY

2.1 EVALUATION

This summary has been prepared based upon the facility changes and modifications that have occurred since the previous Hazard Screening document HS/K-1303/PK/68.9/RO[5] was approved.

The changes to K-1303 are: a) some of the materials identified as "toxic materials" in the previous HS document have been removed from the facility and disposed of, b) a barometer and two pressure transmitters containing mercury were removed from the building, c) waste oil drums were removed from cubicle No. 9 by Waste Management,[6] d) an accumulation of cardboard boxes filled with small containers of paint cleaning materials and chemicals was removed from the building, e) once the combustibles were removed, the water sprinkler system inside the building was disconnected and, f) building K-1303 has been designated as a Solid Waste Management Unit (SWMU) via letter notifications.[7,8]

The hazards evaluated in Building K–1303 are categorized as follows:

- Radioactive materials
  - surface contamination
  - uranium soil contamination

- Toxic materials
  - asbestos
  - PCBs in transformers
  - mercury and oil soil contamination

In addition, the following hazards were identified in Building K-1303 but were "screened out" in the PHS.

- Electrical Energy
  - building electrical system

2.2 CONCLUSION

The toxic materials and electrical hazards either pose no appreciable potential hazard consequences or are Standard Industrial Hazards and are adequately addressed by federal regulations [e.g., Occupational Safety and Health Administration (OSHA)] or national consensus standards and the resulting implementation of the K-25 Site Industrial Hygiene and Industrial Safety Program. Radioactive surface contamination inside the building poses no immediate threat to personnel, since the building is abandoned, posted as required by DOE Order and access controlled. The extent of radioactive contamination of the soil under and around building K-1303 is not currently well defined. The building was earlier declared an environmental restoration site.[9] The responsibility for this site rests jointly with F&PM and D&D.[10] Radioactive contamination is well below the limiting value based on Appendix B, Table 302.4 of 40 CFR 302.4.[11] Soil contamination due to toxic chemicals, such as mercury, uranium, PCBs, etc., beneath the facility is not capable of being released unless excavation is authorized. Therefore, it has been determined that the building's hazard classification is "Other Industrial".

2.3 RECOMMENDATIONS

In the event that paint previously used to coat contaminated surfaces should exhibit peeling or flaking, the area should be decontaminated or the hazard should be evaluated further.

It is recommended that the potential mercury contamination of the soil surrounding the building be taken into consideration by the Environmental Restoration Division when work on Decontamination and Decommissioning (D&D) is planned for the facility K-1303.

3. FACILITY DESCRIPTION

Building K-1303 is a one-story structure using a concrete support structure. The older section of the building has brick exterior and cinder block interior walls and a crawl space underneath it. A more recent addition to the building consists of steel framework and cinder block exterior walls. The roof of the building is made of built-up tar covered with gravel. The building occupies an area of approximately 14,000 square feet.

Constructed in 1944, Building K–1303 accommodated a variety of major operations. It was originally used as a fluorine liquefaction and pressurization facility and was used for this purpose until 1945. From 1947 to 1954, Building K-1303 was used for the decontamination of uranium-enrichment process equipment and uranium recovery facility. In addition, it was used for vacuum distillation and recovery of mercury. In 1960, the building was converted to an air test facility for compressor testing and research. The building is no longer being used. However, a large amount of the compressor equipment is still stored in the building. The electrical service for the building has been deenergized except for the lights above the pull boxes. Also, the water sprinkler system has been shut down and the only fire protection device that exists in the building are the portable fire extinguishers.

3.1 FACILITY LOCATION

Building K–1303 is located in the northeastern portion of the K–25 site (Figure 3.1). The building is bounded by Buildings K–1401 to the south, Buildings K-1301 and K–1302 on the west and K–1407 buildings on the east. See Fig. 3.2. The concrete floor of the building is five feet above grade-level and is approximately 785 feet above Mean Sea Level (MSL). Although there is no criticality potential at K-1303, it has operable criticality alarm system horns and lights since it is within the evacuation zone for detection cluster #38 which monitors the K-1066-B, K-1302, and K-1300 stack area.

3.2 FACILITY LAYOUT

Building K–1303 has two rectangular sections that have a east-west orientation. Both the east and west sides of the building were used as the compressor research areas during the last few years of its operation. The west side consists of radioactively contaminated equipment, a control room, and office area. The east side of the building was a test area with a number of cubicles. The two compressor porches on the east side of the building are enclosed with transite siding. See Figure 3.3.

3.3 PRINCIPAL PROCESSES

The K-1303 building houses equipment and materials related to a research compressor test facility which was installed in 1960. This equipment, which measured compressor performance on air, was shut down in the 1970s.

Initially in 1944, K-1303 housed equipment for the liquefaction of fluorine and pressurization to provide for storage and distribution of gaseous fluorine for the K-25 cascade.

The fluorine process equipment was removed and K-1303 became the decontamination facility for process converters from the K-25 building in 1948. A uranium recovery, mercury distillation, and MFL oil recovery facility was also provided at this time.

Decontamination solution storage piping, recirculating pumps, and evaporators were located outside the K-building. These operations were discontinued before 1954 and the equipment was removed prior to 1960. S condensate from one of these evaporators was routinely discharged 260-ft to the K-1407-B Holding Pond through a 6-in vitrified clay acid drain pipe which coupled prior to discharge to a 4-in stainless steel drain line. This condensate contained dilute concentrations of entrained soluble uranyl nitrate which was further diluted with a 1000 gph water flow during operation of the evaporator. This underground drain pipe may contain residual low levels of uranium contamination. The 4- and 6-in drains are detailed in Carbide and Carbon drawing D-AWP-999/Rev. 1, March 2, 1949. Water and sludge waste from the K-1407-B pond has since been removed and stored in drums. Due to the need to recover the maximum amount of uranium possible, the highly diluted concentrations allowed to be drained, the copious drain/flush volumes and the soluble nature of uranyl nitrate, it is unlikely that uranium deposits exist in the drain pipe. However, the pipe may contain uranium contamination.

During construction of K-1303, wooden box forms used to form the concrete walls and foundation of the building were buried underneath the building instead of being removed. Over the years of operation, spills and leaks occurred which resulted in seepage and potential accumulation of material (both radioactive and toxic) under the building. Excavation and drainage of this area was accomplished when the research compressor test facility was installed. Uranium-bearing nitric acid and other solvents were used during the decontamination and uranium recovery processes and along with mercury from the distillation process and oil from compressor disassembly, contaminated the ground outside the building.

The Mercury Distillation and Recovery Unit was located in cubicle 2 within the north bay of building K-1303 prior to a 103 ft. by 31 ft. northeast bay being added in 1966. In 1948 the cubicle 2 exhaust system was modified to direct and discharge mercury fumes to the atmosphere above the roof of the building. Some of the fumes may have condensed onto the roof and eventually washed by rainfall onto the ground alongside the building. Thus, there is a potential for mercury contamination of the soil surrounding the building and in the storm drain lines..

Per Environmental Assessment Record (Observation) of the Oak Ridge K-25 Site Environmental Assessment of K-1303,[9] the following observations were noted:

1. Radiological contamination was identified as present in Cubicle No. 9. The floor was noticeably covered with an oil residue.

2. A black oil-like residue is present under the exterior sheet metal along the length of the duct located on the east end of the building. The heaviest accumulation is present on soil and pavement near the northeast corner of the building where the duct discharges into the atmosphere.

3. Hydraulic and lubricating oils have been drained from the compressor and auxiliary equipment, however residuals may remain in this equipment.

4. Dilute nitric acid used in the mercury distillation/washing process that formerly operated in Building K-1303 was discharged to the storm drains. This nitric acid contained trace amounts of mercury.

In accordance with the requirements specified in the Department of Energy (DOE) Oak Ridge Reservation (ORR) RCRA Hazardous and Solid Waste Amendment (HSWA) permit, DOE notified the U.S. Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) of the discovery of new solid waste management units (SWMUs) and identified building K-1303 as one of the new SWMU.[7]

A historical investigation of K-1303 is described in the attached report on decontamination facilities and is shown in Attachment A, Appendix C. Mercury releases are discussed in the K-1303 Mercury Distillation and Recovery Unit report shown as Attachment B, Appendix C. The K-1303 facility is part of the Decontamination and Decommissioning Program as outlined in the attached report and is included as Attachment C, Appendix C. The Surveillance and maintenance summary for the facility K-1303 is given in an Environmental Restoration Division Report K/ER-54/R2.[10]

The site boundary includes the underground piping (storage loops) that extend approximately 100 ft west of the building. The extent of contamination of the grounds surrounding the building is unknown except that the stains on the ground at the northeast corner of the building were tested in 1994 and found to contain PCBs at a concentration of approximately 3.4 parts per million.[10]

A radiation survey[10] conducted in 1994 identified an additional area of radiological contamination that has been roped off and posted adjacent to the building. There is no public access and the established radiological controls result in the site's presenting a low potential hazard to employees.

3.4 HAZARD SOURCE INFORMATION

The hazards associated with Building K–1303 are identified in the Preliminary Hazard Screening Worksheet (Appendix A). This document was generated based on an extensive walkdown of the facility and discussions with facility personnel. Much of the data required to assess off-site effects of toxic and radioactive contamination in the soil at this environmental restoration site is not known and will not be available until environmental investigations as a part of the restoration program are completed.

Sources of information relative to the hazards associated with Building K–1303 can be found in Section 7, References 5 through 26.

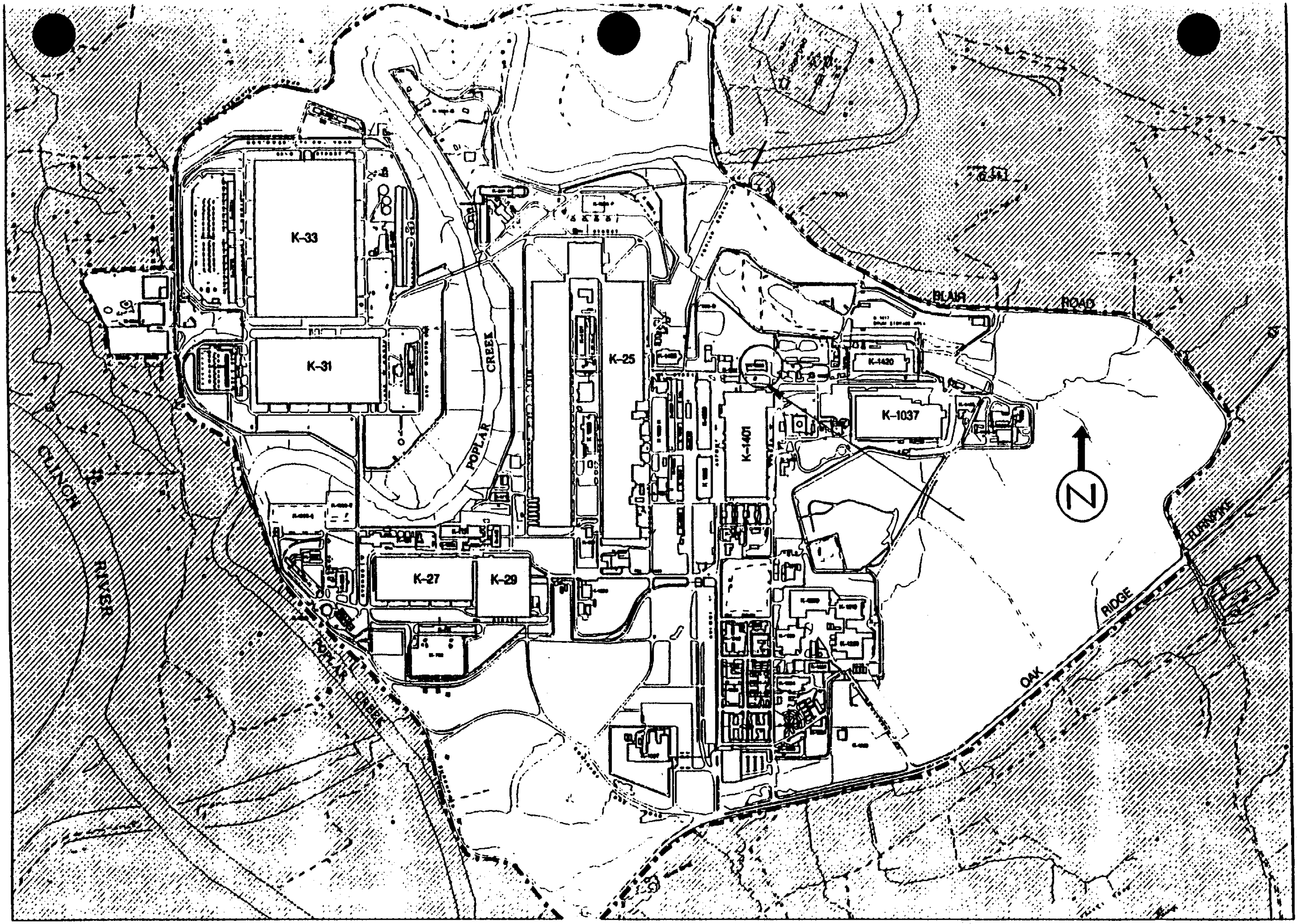


Fig. 3.1. SITE LOCATION

MAP

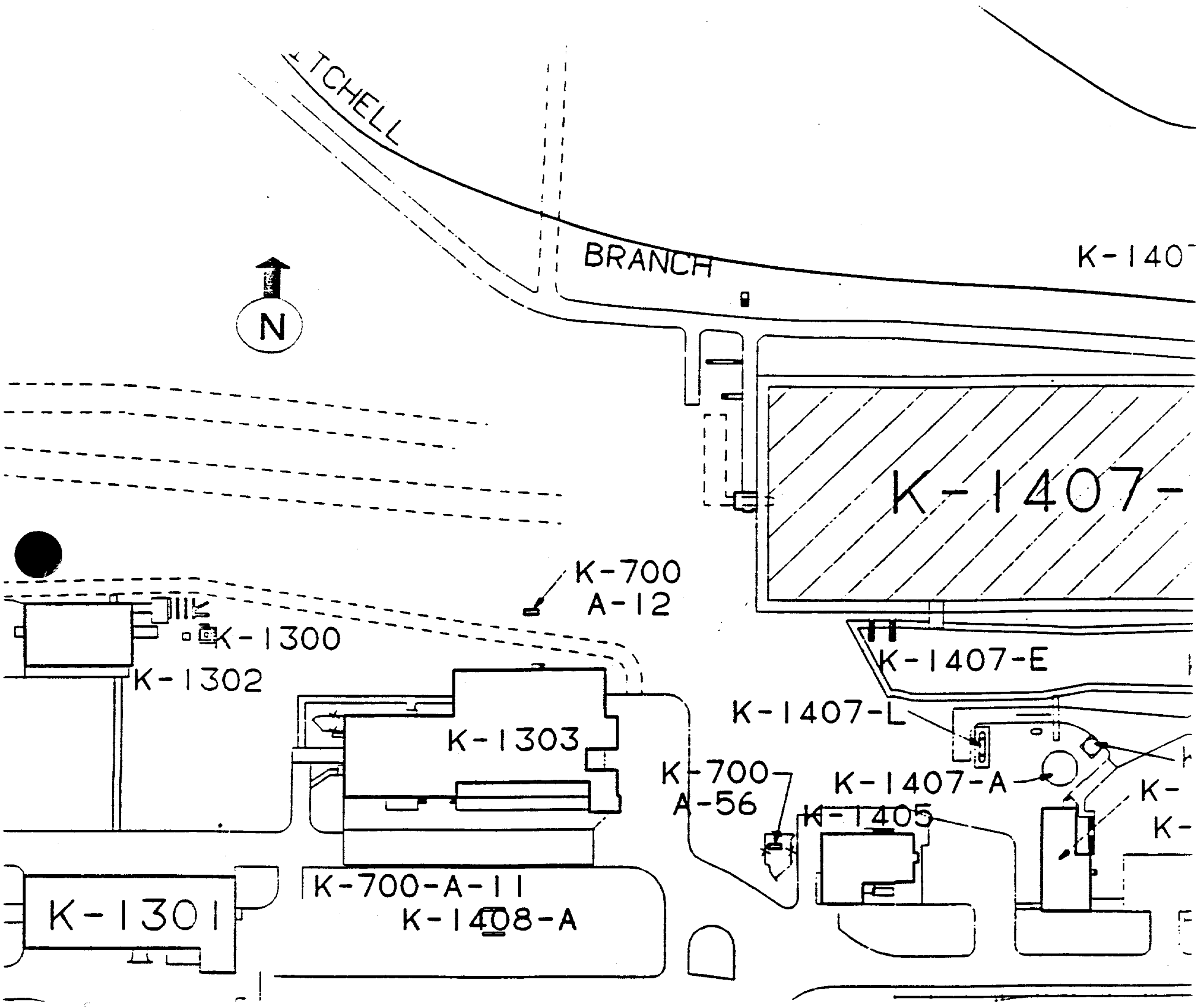


Fig. 3.2. BUILDING LOCATION

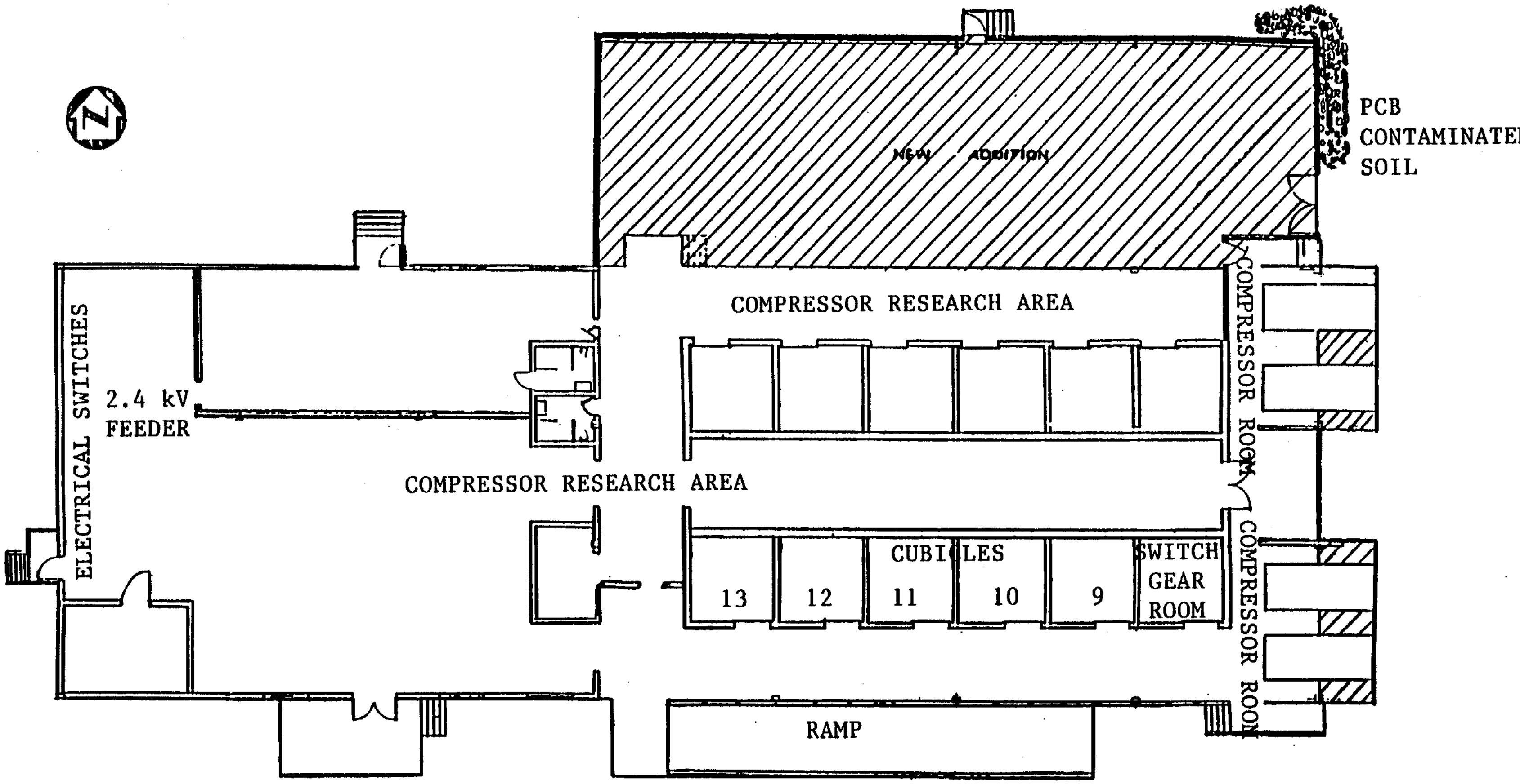


Fig. 3.3. FACILITY LAYOUT OF K-1303

4. HAZARD SCREENING

The results of the hazard screening process for K–1303 are presented on the following work sheets. Since the hazards identified have been determined to be either Negligible or Standard Industrial Hazards, only the Preliminary Hazard Identification Matrix and the Preliminary Hazards Analysis Work Sheets are presented in this document. The work sheets for the Hazard and Operability Study (HAZOP) and the Hazard Classification Input Forms are not applicable.

4.1 HAZARD IDENTIFICATION

4.1.1 Preliminary Hazard Identification Matrix

The Preliminary Hazard Identification Matrix (Figure 4.1) indicates that there are two categories of hazards associated with the K–1303 facility. The Electrical Energy hazard category associated with the building electrical power supply was "screened out" in the PHS and is not discussed further. The remaining categories are discussed below.

4.1.1.1 Compressor Research Area

4.1.1.1.1 Radioactive Materials

The Radioactive Material hazard category was identified for surface contamination found throughout the building as a result of the building being formerly used as a decontamination facility. Metal components and piping, either lying on the floor or packed in 55-gallon drums, are also possibly radioactively contaminated. In addition, there is uranium contamination, within the soil beneath and surrounding the building, and residual uranium contamination may be in the 6-in VCP recovery process drain line.

4.1.1.1.2 Toxic/Corrosive/Reactive Materials

The Toxic/Corrosive/Reactive Material hazard category was identified for mercury and oil contamination under the facility, asbestos in insulation and switchgear room and PCBs inside transformers in the research compressor area of Building K–1303.

4.1.1.2 Cubicles No. 9, 10, 11, 12 and 13

4.1.1.2.1 Radioactive Materials

Metal components and various parts of compressors and metal piping are stored in all these cubicles. All these stored materials are possibly radioactively contaminated and identified for surface contamination.

DATE: September 1995

FACILITY: K-1303

HAZARD TYPE

Item No.	System/Subsystem Description	SNM	Radioactive Materials	Toxic/ Corrosive Reactive Materials	Flammable Materials	Explosive/ Pyrophoric Materials	Electrical Energy	Thermal Energy	Kinetic Energy	Potential Energy	Other	Remarks
1.0	Compressor Research Area		X Notes 1,3	X Note 2								Note 1: Surface Contamination. Note 2: Toxic Materials include asbestos in insulation and PCBs in transformers, and mercury and oil contamination under building. Oil inside equipment. Note 3: Possibly radioactively contaminated metal components and piping on floor and stored inside 55-gallon drums.
2.0	Cubicles No. 9, 10, 11, 12 and 13		X Note 3									

*Hazard "screened out" in PHS Work Sheets (refer to Appendix A).

Fig. 4.1. Preliminary Hazard Identification Matrix.

4.1.2 Preliminary Hazard Analysis Worksheet

The Preliminary Hazard Analysis Work Sheet (Fig. 4.2) identifies the hazard types and possible consequences associated with each hazard. Several of the identified hazards associated with this facility were determined to be either Negligible or Standard Industrial Hazards as shown on the worksheet and discussed below.

4.1.2.1 Compressor Research Area

4.1.2.1.1 Radioactive Materials

Building K–1303 is posted as a radiological area due to surface contamination in various areas of the building. The building was abandoned many years ago and is unoccupied. The surface contamination hazard, when controlled to industry standards poses no danger to health and safety of the public nor to K–25 Site employees. A more detailed evaluation of surface contamination is presented in Appendix B, which shows the conservatively estimated radioactivity (0.03 Ci) of the entire facility is well below the limiting value (0.1 Ci) based on Table 302.4 of 40 CFR 302.4.

The control of radiation hazards at DOE sites is addressed by DOE/EH-0256T,[12] "DOE Radiological Control Manual". These requirements are implemented by site procedures, such as, SPP-802,[13] "K-25 Site Radiation Protection Program"; SPP-5763,[14] "ALARA Program"; and K/HS-588,[15] "K-25 Radiological Control Program Manual."

Implementation of site procedures provides adequate assurance that inadvertent exposure to radiation is as low as reasonably achievable and within acceptable risk to occupational radiation workers. In addition to the above, the following measures reduce or eliminate exposures:

a) the facility is left locked and keys are controlled by the Building Operator,

b) the facility is located away from continuously occupied facilities,

c) the facility is posted as a Contamination Area and RWP requirements are to be met for entry, and

d) there is no processing inside the facility that involves significant energy sources.

e) the electrical service has been deenergized.

In accordance with the guidance of CSET-2,[16] the hazard associated with surface contamination within Building K-1303 is considered negligible. In the event that paint previously used to coat contaminated surfaces should exhibit peeling or flaking, the contamination will no longer be considered "fixed", and the area should be decontaminated or the hazard should be evaluated further.

As a result of inadvertent process equipment leakage it is likely that uranium contamination is present in the ground beneath Building K-1303. The most recent addition to the building has covered this area making it inaccessible to personnel. The uranium recovery process drain line in the K-1407-B pond may also be radioactively-contaminated. Also, it should be noted that due to the close proximity of the brick stack of K-1302 facility, the many years of venting effluents through this stack resulted in deposition of uranium-bearing compounds not only at the base of the brick stack but also in the adjoining grounds

grounds which was a part of the K-1303 Facility Safe Geometry Solution Storage Loops. Potential environmental hazards as a result of contamination of the soil beneath Building K–1303 cannot be fully evaluated until data from Environmental Restoration Program investigations is available.

The extent of contamination of the grounds surrounding the building is not characterized in detail. A radiation survey[10] conducted in 1994 identified an area of radiological contamination that has been roped off and posted adjacent to the building. There is no public access and the radiological controls at this site are adequate to assure a negligible potential hazard to employees.

The building is presently under a Surveillance and Maintenance (S&M) Plan[10] for inactive environmental restoration remedial action sites at the Oak Ridge K-25 Site. Facility and Property Management (F&PM) Department and Decontamination and Decommissioning (D&D) have joint responsibility for K-1303 and the surrounding site. The site is in the K-1401 operable unit.

4.1.2.1.2 Toxic/Corrosive/Reactive Materials

Asbestos has a health rating of 4 and is a known human carcinogen.[17] In K-25 Site, it is found in some pipe insulation and electrical breaker systems. 29 CFR 1910.1001 and 29 CFR 1910.1926.58[18] specifically address asbestos and other related materials. In addition, the state of Tennessee also implements statutes (1200-3-116-02)[19] that address hazardous air contaminants including asbestos.

The K-25 Site has environmental, safety and health (ESH) standard, ESH 3.0,[20] and Standard Practice Procedures, SPP-4105,[21] that address personnel exposures and releases of asbestos. These procedures require that exposure to airborne asbestos fibers be maintained at, or reduced to, the lowest practical level using the best available technology.

Since the safety issues concerning personnel exposure and control of asbestos are regulated by national and state codes, as well as by site procedures, the presence of asbestos in line insulation and breakers in electrical systems is considered a Standard Industrial Hazard and needs no further evaluation.

4.1.2.1.2.1 PCB's in Equipment

Polychlorinated Biphenyls (PCBs) found in transformers and electrical distribution system exist in quantities consistent with those found in similar systems throughout the general industrial complexes. Hazards associated with these systems are well known and adequate safety guidance exists for their varied uses. In addition, state and federal regulations address issues concerning PCBs. Section 6 of the Toxic Substances Control Act (TSCA)[22,23] covers regulation of hazardous chemical substances including PCBs. SPP-4102[24] ensures that guidance and direction are provided to all site personnel so that all spill clean up activities involving known or suspected PCBs are conducted in compliance with TSCA regulation, DOE orders, Federal Facility Compliance Agreements, and Martin Marietta Energy Systems, Inc., standards.

The EPA does not recognize any one particular method of analysis for PCB spill cleanup. However the analytical guidelines developed by Midwest Research Institute (MRI), "Verification of PCB Spill Cleanup by Sampling and Analysis" and the MRI guidance document, "Field Manual for Grid Sampling of PCB Spill Sites to Verify Cleanup" may be used wherever practical. PCB is also addressed in IEEE 799-87.[25] Per Table 302.4 of 40 CFR 302.4, the Reportable Quantity (RQ) for PCB is 1 lb.

Since the PCBs spills, cleanups and disposal are controlled by the above procedures and national codes/standards, the presence of PCBs is considered Standard Industrial Hazard and, therefore, there is no need for further evaluation.

4.1.2.1.2.2 PCB's in Soil

Stains on the ground at the northeast corner of the building were tested in 1994 and found to contain PCBs in a concentration of 3.4 parts per million.[10] There is a potential mercury contamination of the soil surrounding the building. It is recommended that these contaminations be taken into account by the Environment Restoration Division when work on Decontamination and Decommissioning is planned for the facility K-1303. The RQ level for mercury is 1 lb per Table 302.4 of 40 CFR 302.4.

4.1.2.2 Cubicles 9, 10, 11, 12 and 13

4.1.2.2.1 Radioactive Materials

Metal components and piping sections are found in these cubicles. While some of these are stored inside 55-gallon drums, most of them are placed on the floor. All of these materials are possibly radioactively contaminated. Since this facility is under the D&D program, all the contaminated metal components will be thoroughly checked and surveyed for contamination levels prior to disposal. A detailed evaluation of surface contamination is presented in Appendix B. In accordance with the guidelines set in CSET-2, the hazard associated with contamination within the facility K-1303 is considered negligible. See Section 4.1.2.1.1.

The abandoned status of the building with no occupancy and limited access to personnel combined with surface type contamination controlled to industry safety standards poses no danger either to health and safety of the public or to K-25 site employees. No further evaluation is, therefore, required.

4.1.2.3 Natural Phenomena Effects

Natural phenomena effects are considered as shown below:

a) Metal components inside the 55-gallon drum and those lying on the floor may be moved or toppled during any of the natural phenomena occurrences. In the event of an earthquake or high winds resulting in the structural failure of the building, these drums and metal components may be impacted by falling debris. It may be reasonable to assume that these materials due to their weight and heavy construction will remain in the structure with no loss of contents.

b) Grade elevation at the facility is approximately 780 feet above Mean Sea Level (MSL). The concrete floor elevation of the facility is about 785.08 feet above MSL. At Poplar Creek River, mile 4.4 (Blair Road bridge), the flood elevation is 759.6 feet for the 2,000 year flood and 762.1 feet for the 10,000 year flood.[26] These flood levels are well below the facility elevation. Therefore, the effects of flood are not considered.

c) The land to the north of the facility slopes towards the river and, therefore, local ponding is not a concern.

Based on the above considerations, severe natural phenomena will have negligible effects on the contents of the building.

DATE: September 1995

FACILITY: K–1303

Item No.	System/Subsystem Description	Hazard Type	Consequence	Initiating Event	Standard Industrial Hazard Y or N	Justification for Std. Ind. Hazard and Comments
1.0	Compressor Research Area	Radioactive Materials	Personnel exposure to ionizing radiation	Personnel entry into radiological area	N	Fixed surface contamination when controlled to industry standards is considered a Negligible Hazard. Inaccessibility of material contribute to unlikelihood of significant radiation exposure. Negligible Hazard. See Appendix B.
		Toxic/ Corrosive/ Reactive Materials	Personnel exposure to skin and respiratory irritants due to PCBs and asbestos	Leaking or rupture or spilled containers	Y	Insufficient quantities of toxic material to pose a safety concern. Small quantities represent Standard Industrial Hazards. Inaccessibility to mercury and oil contamination beneath building support these materials representing no appreciable hazard.

* - Hazard "screened out" in the PHS, as approved by PSET.

Fig. 4.2. PRELIMINARY HAZARDS ANALYSIS WORKSHEET

4.2 INITIATING EVENT IDENTIFICATION AND SELECTION

The surface contamination and toxic materials identified inside Building K-1303 have been evaluated and are considered to be negligible or Standard Industrial hazard which are adequately addressed by federal regulations (e.g., OSHA) or national consensus standards. In accordance with CSET-2 guidance, no initiating event identification and selection is required for hazards categorized as Negligible or Standard Industrial Hazards. Therefore, the Hazard Classification Input forms are not included.

4.3 SCENARIO DEVELOPMENT

Per CSET-2, this section is not applicable to identified hazards categorized as Negligible or Standard Industrial Hazard.

4.4 CONSEQUENCE DETERMINATION

Per CSET-2, this section is not applicable to identified hazards categorized as Negligible or Standard Industrial Hazard.

4.5 INITIAL HAZARD CLASSIFICATION

The surface contamination and toxic materials identified inside Building K-1303 are either Negligible or Standard Industrial Hazards and are adequately addressed by federal regulations (e.g., OSHA) or national consensus standards. Detailed characterization data required to assess the potential health effects from ground contaminants is not currently available, however, a credible release mechanism for the material is unavailable except for excavation. Therefore, the Hazard Classification under inactive conditions is "Other Industrial".

5. SAFETY DOCUMENTATION REQUIREMENTS

5.1 ADDITIONAL SAFETY DOCUMENTATION REQUIRED

Additional safety evaluation including soils and piping contamination characterization of hazards resulting from Uranium contamination, Mercury, PCB, and oil under Building K-1303, in the buried drain piping, and in the soil surrounding the building is required if the area is to be excavated.

5.2 ANALYSIS ASSUMPTIONS AND OPERATING LIMITS

This Hazard Classification assumes that the facility will not be operated nor routinely occupied. Also any deviation from this system configuration that could introduce an unanalyzed hazard, will require further analysis in accordance with DOE requirements and Lockheed Martin Energy Systems guidance. Any operation or modification requiring excavation of soil on the building premises or the immediate surrounding area may require additional characterization and safety analysis to evaluate potential hazards resulting from contamination of the soil and piping beneath the building and will be controlled by excavation permitting. Furthermore, D & D of the building should consider the potential for removable contamination as a result of peeling and chipping of coats of paint used in the past years for fixing surface contamination.

6. MATERIALS AND HAZARDS THAT COULD AFFECT OTHER FACILITIES

Facilities adjacent to Building K–1303 are Buildings K–1401, K–1301, K–1302, and the K–1407 Buildings. The fixed surface contamination and toxic material hazards inside Building K–1303 are negligible and/or Standard Industrial Hazards and are of a nature such as not to affect these adjacent facilities. Similarly potential hazards from undisturbed Uranium contamination, mercury and oil in the soil under and around Building K-1303 would not impact adjacent facilities, but should be better characterized prior to excavation.

7. REFERENCES

1. DOE Order 5480.23, *Nuclear Safety Analysis Reports*, U.S. Department of Energy, Washington D.C., April 10, 1992.

2. DOE Order 5481.1B, *Safety Analysis and Review System*, U.S. Department of Energy, Washington D.C., September 23, 1986

3. DOE-EM-STD-5502-94, *DOE Limited Standard, Hazard Baseline Documentation*, U.S. Department of Energy, Washington D.C., August 1994.

4. DOE-STD-1027-92, *DOE Standard, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, U.S. Department of Energy, Washington D.C., December 1992.

5. HS/K-1303/PK/68.9/RO, *Phase I Hazard Screening Analysis for Building K-1303 Mercury Distillation and Uranium Recovery Facility (Environmental Restoration Site)*, February 24, 1992.

6. *Internal Correspondence From E.L. Allred to K.L. Brady, L.D. Owens and R.L. Higgins*, April 17, 1991.

7. *Letter from R. C. Sleeman of DOE, Oak Ridge, to Ms. Beverly Spagg of EPA*, November 21, 1991.

8. *Letter ERP-TI/91-513 from L. D. Bates to R. C. Sleeman*, October 29, 1991.

9. K/ER-47, *Site Description of Environmental Restoration Units at the Oak Ridge K-25 Site*, Oak Ridge, TN, October 1991.

10. K/ER-54/R2, *Surveillance and Maintenance Plan for Inactive Environmental Restoration Remedial Action Sites at the Oak Ridge K-25 Site*, Rev. 2, January 16, 1995.

11. Code of Federal Regulations, 40 CFR 302.4, *Designation of Hazardous Substances*, July 1, 1994 Edition

12. DOE/EH-0256T, *DOE Radiological Control Manual*, April 1994.

13. Standard Practice Procedures, SPP-802, *K-25 Site Radiation Protection Program*, March 1991.

14. Standard Practice Procedures, SPP-5763, *ALARA Program*, Rev. 0.

15. K/HS-588, *K-25 Radiological Control Program Manual*, March 1995.

16. Central Safety Evaluation Team, CSET-2/R1, *Safety Analysis Report Update Program, Hazard Screening Application Guide,* June 1992.

17. Lockheed Martin Energy Systems, *Material Safety Data Sheets Database*.

18. Code of Federal Regulations, 29 CFR 1910, *Occupational Safety and Health Standards*, Occupational Safety and Health Administration, July 1, 1994.

19. Tennessee Air Quality Regulations, Chap. 1200-3-116-02, *Tennessee State Regulations for Hazardous Air Contaminants Including Asbestos.*

20. Environmental, Safety and Health Standard ESH-3.0, *Occupational Health Protection Standards and Requirements for Asbestos Removal/Demolition*, April 1990.

21. Standard Practice Procedures, SPP-4105, *Management of Asbestos-Containing Materials*, Rev. 0.

22. Code of Federal Regulations, 40 CFR 761, *Environmental Protection Agency Rules for Controlling Polychlorinated Biphenyls under the Toxic Substances Control Act*, November 26, 1990.

23. *Toxic Substances Control Act*, July 18, 1988.

24. Standard Practice Procedures, SPP-4102, *Cleanup of Spills Involving PCBs*, Rev. 0.

25. Standard IEEE 799-87, *Guide for Handling and Disposal of Transformer Grade Insulating Liquids Containing PCBs*, Institute of Electrical and Electronic Engineers.

26. Tennessee Valley Authority Report, *Flood Analyses for Department of Energy, Y-12, ORNL and K-25 Plants*, December 1991.

APPENDIX A

PRELIMINARY HAZARD SCREENING WORKSHEETS

FOR

BUILDING K–1303

PRELIMINARY HAZARD SCREENING WORKSHEET

FACILITY NO.: K-1303
FACILITY NAME: Air Model Test Facility
FACILITY OPERATOR: J. M. Potter

Document No.: HS/K-1303/PK/68.9/R2
Prepared By: M. Sadasivam
Date: September 1995

TYPE HAZARD	KEEP IF CRITERIA ARE EXCEEDED	ACTION DECISION[1]	ACTION DECISION BASIS
Radioactive Material	Any radioisotope meeting or exceeding the Table A1, DOE-STD-1027-92 TQ criteria; or exceeding the Appendix B, 40 CFR 302 RQ criteria. The inventory/RQ or inventory/TQ ratios shall be added when making this evaluation.	Keep	High levels of surface contamination, about 100,000 dpm/100 cm^2 in certain areas of building. Possible contaminated metal parts and components in 55-gal drums and in cubicles 9, 10, 11, 12, and 13. One cylinder of helium (radioactively-contaminated).
Toxic Material	Any toxic chemical ≥ RQ from Table 302.4, 40 CFR 302; or any other known toxic material (e.g., NIOSH Pocket Guide to Chemical Hazards lists an IDLH)	Keep	½-in thick anti-sweat asbestos insulation on water service lines and asbestos in switchgear room. PCBs inside transformers. Possible PCB and mercury contamination under new building extension.
Carcinogen	Any known carcinogen > RQ from Table 302.4 is included and considered in the "Toxic Material" ACTION DECISION BASIS above. Other known or suspect carcinogens are under administrative and physical controls. Reference LMES SPP-4111, SPP-5758[2] and ESS-IH-139 or equivalent.	Not Applicable	None present.
Biohazard	Any known biohazard where special controls are required	Not Applicable	None present.
Asphyxiant	Any asphyxiant that could either affect a large number of people or any unsuspecting people	Not Applicable	None present.
Flammable Material	> 5000 lb of a liquid with a flash point < 100°F or > 3000 standard ft^3 of gas with an established LEL	Not Applicable	None present.
Reactive Material	> 10 lb of a substance with a NFPA reactivity hazard level ≥ 2	Not Applicable	None present.
Explosive Materials	Any 49 CFR 173 Division 1.1, 1.2, or 1.3; or > 10 oz of Division 1.4	Not Applicable	None present.
Incompatible Chemical Reaction Products	Presence of > 1 kg of two or more incompatible chemicals listed in Appendix B of ES/CSET-2/R1 in same area	Not Applicable	None present.
Electrical Energy	Unusual application not adequately controlled by OSHA (e.g.; soil vitrification)	Screen Out	2.4 kV feeder to main switchgear. Maximum supply of electrical service to equipment is 480 V, 3 phase < 600 V. Addressed by HS/EDS/PK/0/R0.[3] At the present time, the electrical service is deenergized.
Kinetic Energy	High energy (e.g., flywheel or centrifuge type equipment)	Not Applicable	None present.

PRELIMINARY HAZARD SCREENING WORKSHEET

FACILITY NO.: K-1303
FACILITY NAME: Air Model Test Facility
FACILITY OPERATOR: J. M. Potter

Document No.: HS/K-1303/PK/68.9/R2
Prepared By: M. Sadasivam
Date: September 1995

TYPE HAZARD	KEEP IF CRITERIA ARE EXCEEDED	ACTION DECISION[1]	ACTION DECISION BASIS
High Pressure	$\geq$ 3000 psig or $\geq$ 0.1 lb TNT equivalent energy	Not Applicable	None present.
Lasers	Any Class IV, any Class III with non-enclosed beam per American National Standards Institute Z-136.1	Not Applicable	None present.
Potential Energy	Elevated mass with "high" potential energy or equivalent	Not Applicable	None present.
Accelerators	Keep (Classify based on DOE Order 5480.25)	Not Applicable	None present.
X-ray Machines	Any not meeting ANSI N537/NBS123 requirements	Not Applicable	None present.
Other		Not Applicable	None present.

[1]Action decision is "Keep" if criterion is exceeded, or "Screen Out" if:
a) criterion is not exceeded
b) criterion is not applicable
c) criterion is exceeded, but justification as "Other Industrial" hazard requiring no further evaluation is attached and approved.

[2]Facility safety engineer (FSE) and facility operator must ensure adherence to LMES SPPs prior to Screen Out.

[3]HS/EDS/PK/0/R0, *Safety Analysis Report Update Program, Phase I Hazard Screening for K-25 Site Electrical Distribution Systems*, February 1992.

APPENDIX B

SURFACE CONTAMINATION AT K-1303

Surface Contamination at K-1303

I. Introduction and Objectives

A. Statement of Problem

Surface contamination above the screening levels in CSET-2[1] is a common hazard at the K-25 Site. Contaminated surfaces are identified, characterized, and controlled by the K-25 Site procedures and maintained at ALARA levels such that the consequences from potential exposures from "non-work" surfaces are expected to pose no appreciable health consequences. "Non-work" surfaces are defined as:

Floors, walls, ceilings, walkways, external surfaces of process enclosures (cell housings, hot cells, glove boxes, etc.), handrails, windows, electrical utilities, HVAC components, and plumbing fixtures. Also, for the purpose of this evaluation, "non-work" surfaces include furniture surfaces such as chairs, desks, tables, stools, countertops, lockers, benches, cabinets, vending machines, and appliances. (Reference 3)

A conservative evaluation of contaminated "non-work" surfaces for Hazard Screening is provided. Facilities determined to require further analysis may be well determined to pose no significant hazard once a specific analysis is completed.

Exposure of occupational workers to fixed contamination, when controlled to industry standards, is well within the levels of a Negligible Hazard as per the guidance of CSET-2[1]. For removable contamination, this evaluation compares the total activity to the limits of Appendix B to Table 302.4 of 40 CFR 302.4[2].

II. Basis for Design

A. Design Input and Source

Information regarding the levels of removable surface contamination was obtained from recent surveys completed by Health Physics. See Attachment A. The levels in K-1303 are bounded by assuming an area-wide contamination of 100,000 dpm/100 cm^2 (conservative).

B. Assumptions

1. The removable surface contamination is uniformly distributed over the contaminated area of the facility.

2. The contaminated area of the facility is assumed to consist of floors, ceiling and walls.

C. Method to be Used

1. Evaluation Method

The concern associated with surface contamination is described herein. The potential effects of an atmospheric release to persons on-site and off-site are evaluated by comparison with the total

M33 adaSivam
(Prepared)

(Checked)

radioactivity to Reportable Quantities in Appendix B of Table 302.4 of 40 CFR 302.4[2]. DOE has determined that a total release of radioactivity below these limits does not require safety evaluation.

While health effects due to radiation are generally characterized as a function of the dose received, expressed in rems, the typical measure of contamination available from Health Physics surveys is given in disintegrations per minute (dpm) per 100 cm^2 of surface area. Thus, the calculations herein are presented in terms of the contamination measures.

1.1 Radiological

To develop a measure of the relationship of the level of contamination with the surface area contaminated, consider a removable surface contamination level of 100,000 dpm/100 cm^2. Discussions with Health Physics personnel indicates that this level is unlikely to be found at the K-25 Site, except in small isolated areas as indicated by survey data.

For a removable surface contamination level of 100,000 dpm/100 cm^2, the corresponding contaminated area which contains a total radioactivity equal to the Reportable Quantity (RQ) in Appendix B to Table 302.4 of 40 CFR 302.4[2] is

$$A = \frac{RQ(2.2 \text{ x } 10^{12} \text{ dpm/Ci})}{\left(\dfrac{100{,}000 \text{ dpm}}{100 \text{ cm}^2}\right)\left(930 \dfrac{\text{cm}^2}{\text{ft}^2}\right)} = 2{,}365{,}600 \text{ RQ ft}^2/Ci$$

The total area, A, of K-1303 posted as a contamination area is 14,000 ft^2, i.e., the whole area of the building. To obtain an estimated value, use a factor of 15 to include the area of walls, ceilings, cubicles, and also the surface area of all metal components contaminated in this facility. Therefore, the total area is 15 x 14,000 = 210,000 ft^2. Therefore, radioactivity Q = 210,000 ÷ 2,365,600 = 0.09 Ci < 0.1 Ci, which is the limiting value based on Appendix B of Table 302.4 of 40 CFR 302.4[2] for the uranium compounds of interest.

III. References

1. Central Safety Evaluation Team, CSET-2, *Safety Analysis Report Update Program, Hazard Screening Application Guide*, June 1992, Rev. 1.

2. 40 CFR 302.4, *Designation of Hazardous Substances*, 7-1-94 Edition.

3. ORO *"Radiation Contamination Control Policy"*, June, 1989.

M. S. Badasivam
(Prepared)

(Checked)

ATTACHMENT A

RADIATION \ CONTAMINATION SURVEY

FACILITY K-1303 ROOM N/A DATE 1-23-95 TIME 0900

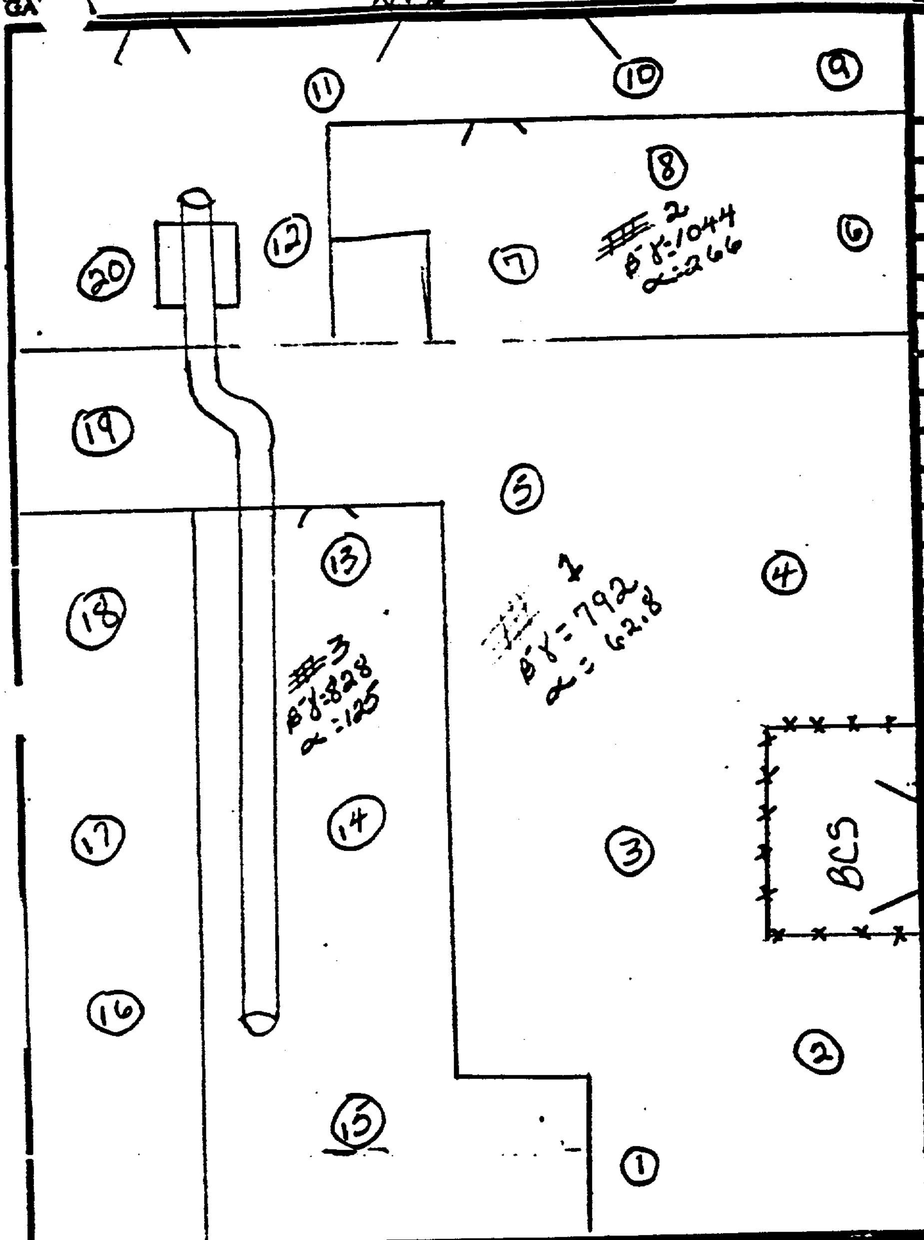
PURPOSE Pre Job Survey RWP# N/A

INSTRUMENTS USED: TECHNICIAN D. Bartlett 635342 [signature]

βγ #/LLD H0204 / 91.6 / 67.0 T. Overman 135281 [signature]

α #/LLD H0121 / 984.4 / 493.2

GA N/A



[illegible]	[illegible]		[illegible]		[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	78	650	15.6	167	
2	31.4	756	23.4	70.4	
3	78.5	1080	23.4	66	
4	125.6	1140	7.8	39.6	
5	15.7	856	23.4	35.2	
6	62.4	6120	15.6	72.6	
7	47.1	18,800	31.2	132	N A
8	110	8600	23.4	127	
9	78.3	5616	47	120	
10	141	6800	54.4	70	
11	315	9000	63	97	
12	315	11,700	31.2	80	
13	78.5	7,120	23.4	105	
14	612	16,400	31.2	75	
15	251	5830	15.8	53	
16	393	6840	23.4	62	
17	330	3940	47	80	
18	267	7020	63	53	
19	374	7060	23.4	45	
20	722	86,400	39	106	

N A

REMARKS # Indicates Large Area swipes. Activity Noted in dpm/100cm
All Smears Field Counted and Activity Noted Above
BKGD βγ = 40
α = 2

HEALTH PHYSICS AREA SUPERVISOR REVIEW [signature] DATE 1/25/95

ADDITIONAL REMARKS ON BACK ? (check ☐)

APPENDIX C

REPORTS ON K-1303

ATTACHMENT A

HAZARDOUS WASTE SITES
HISTORICAL INVESTIGATION
SITE #40, K-1303 - DECONTAMINATION FACILITIES

K-1303 - Compressor/Air Model Test Facility/Formerly Titled K-1303 Oil-Soaked Asphalt/Gravel/ Grass

The K-1303 facility has historically accommodated a variety of operations. Accordingly, this report goes beyond an investigation of the oil-soaked asphalt/gravel/grass site. It addresses all of the processes the facility supported from the inception of building operations to the cessation of major activities.

The original function of the K-1300 area was to produce fluorine for the stabilization of the internal surfaces of the gaseous diffusion process system. The area was designed and operated by the Hooker Electro-Chemical Company under contract to the Manhattan District. The fluorine produced was then piped to any of 12 cubicles in the east half of the K-1303 building. Each of these cubicles was provided with fluorine cryogenic collection vessels where the product of the K-1301 cells was condensed as a liquid utilizing liquid nitrogen from the K-1408 liquid nitrogen storage facility which was located in this area. The liquid fluorine collection vessels were periodically operated through a heat cycle and the liquid fluorine was converted to a pressurized gas which was distributed to either of three 670 ft^3 nickel clad storage tanks located in the K-1302 building. Diaphragm compressors developed by Lapp were installed in K-1301 in 1947, negating the need for the hazardous and expensive fluorine liquefaction operation. The gaseous fluorine was compressed and distributed direct to the K-1302 storage tanks. Due to this operating change, the K-1303 facility was no longer needed for its original function. The fluorine liquefaction/ vaporization equipment was removed, and the area was assigned to new operations. In the period 1947 to 1956, operations in K-1303 included recovery and stabilization of uranium-contaminated fluorinated lubricating oils (MFL) by filtration and reaction with cobaltic fluoride, vacuum distillation of mercury for use in process instruments, oxidation of ammonium diurate in electric furnaces, and various uranium solution, solid, and gaseous processing and sampling operations. These operations were conducted in the east half of the K-1303 building.

In 1948, a size 1, 2, 3, and 4 converter dismantling and decontamination facility was installed in the west end of K-1303. This operation terminated in 1955 when the K-1420 decontamination facility became operational. The K-1303 decontamination/recovery facility had disassembly booths on the southwest side of the existing building and stainless steel spray booths in the west end of K-1303. Safe geometry solution storage loops extended ~100 ft west of the building. Solution leakage may have contaminated the soil in this area. Evaporators were provided at the west end of the solution storage loops and north of the K-1303 building for concentrating the contaminated cleaning solutions (HNO_3 and H_2O) and uranyl nitrate product. Underground condensate drain lines extended from these evaporators east to the K-1407 Holding Pond. Inadvertent leaks from the decontamination spray booths located in the west end of K-1303 and the solvent extraction uranium recovery system in the southwest quadrant of the building probably contaminated the soil underneath this section of the building.

Following the cessation of the decontamination operations in the mid-1950s, the K-1303 facility was used for a research compressor operation, and then in the late 1960s, other modifications were made to accommodate an air model test operation.

Described as a wind tunnel operation, the K-1303 air model test facility provided a means for fluid testing of internal flow fields using air as the test fluid. The testing has historically been directed to aerodynamic studies of scale models of compressors, converters, and piping components associated with the gaseous diffusion process.

The air model test facility is an open loop system. Air is pumped by one or more of four exhauster compressors with flow control valves, moving the air through interconnecting piping between the test stands. The compressors are capable of moving air at mach levels.

The compressors, downstream of the model test stations, periodically leaked oil. The air flow entrained the oil leaks and discharged same to the outside via the air exhaust duct system. The oil is identified to be a medium weight lubricant - code BG.

The oil-stained area is located and runs parallel to the east face of the K-1303 facility.[1] The perimeter outline of this area is described as matching a vertical projection of the overhead exhaust duct. No toxic or radioactive materials are associated with operation of the air model test facility. The earlier use of the facility and adjoining ground area for decontamination operations raises concern of latent ground contamination under and outside of Building K-1303.

Although this text is purposely limited to an investigative report of the K-1303 operations, it is suggested that one element of the K-1302 facility be included in future investigations of the K-1303 area. The original purpose for the K-1302 brick stack is to vent each concrete structure that houses each fluorine storage tank and to vent the discharge lines from the tank's rupture lines from the tank's rupture discs. Later, vent systems that serve the K-1401, K-1301, and K-1420 facilities were connected to the K-1302 vent exhaust system:

- K-1401 Furnace Stands/Converter Conditioning: Effluents from various fluorination systems were passed through cold traps and scrubbing processing prior to discharge to K-1302 vent exhaust system.

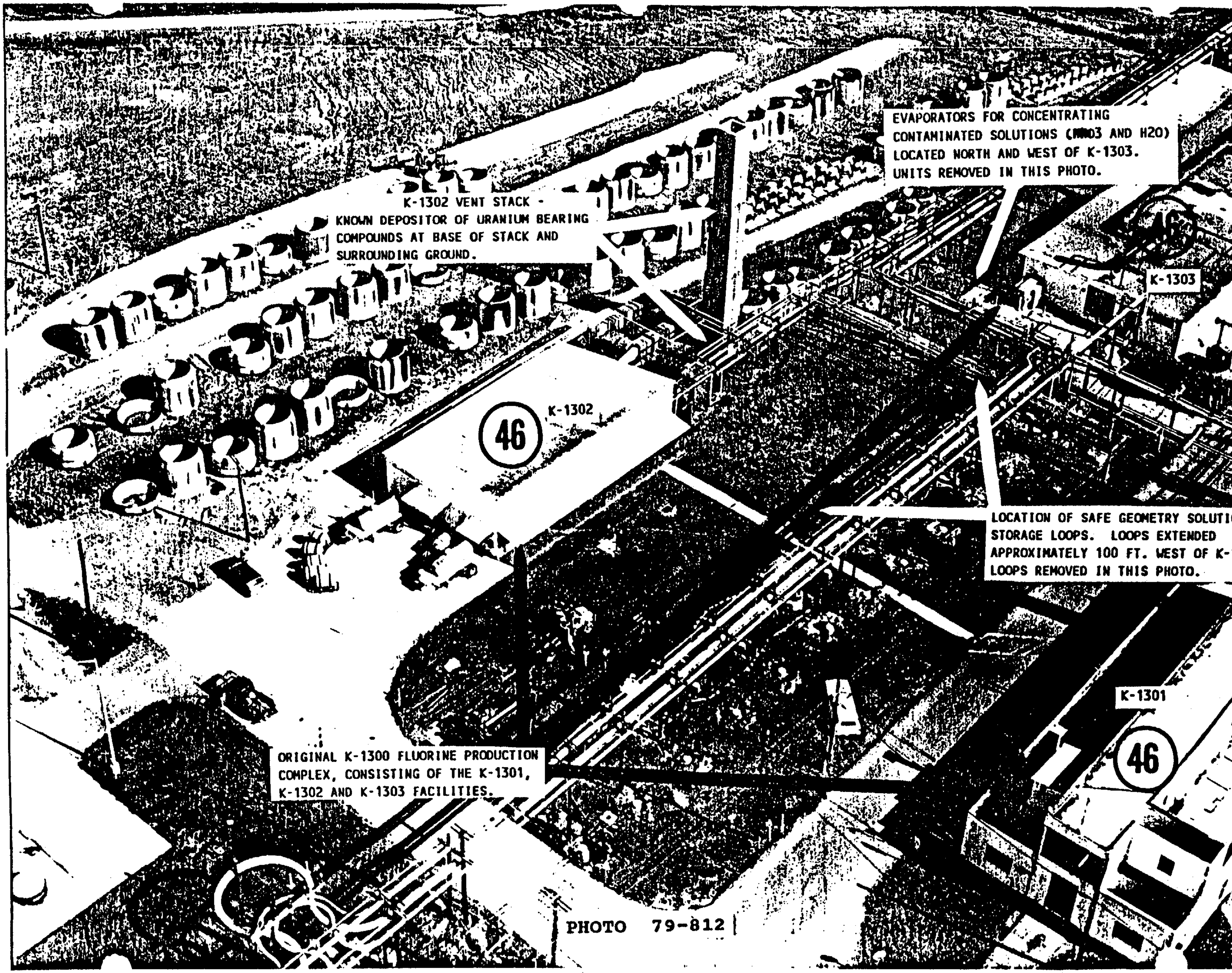
- K-1301 Uranium Oxide Fluorination Facility: Enriched oxides recovered from process equipment were converted to UF_6. Vent gases from this operation were passed through KOH solution scrubbers prior to discharge to K-1302 vent exhaust system.

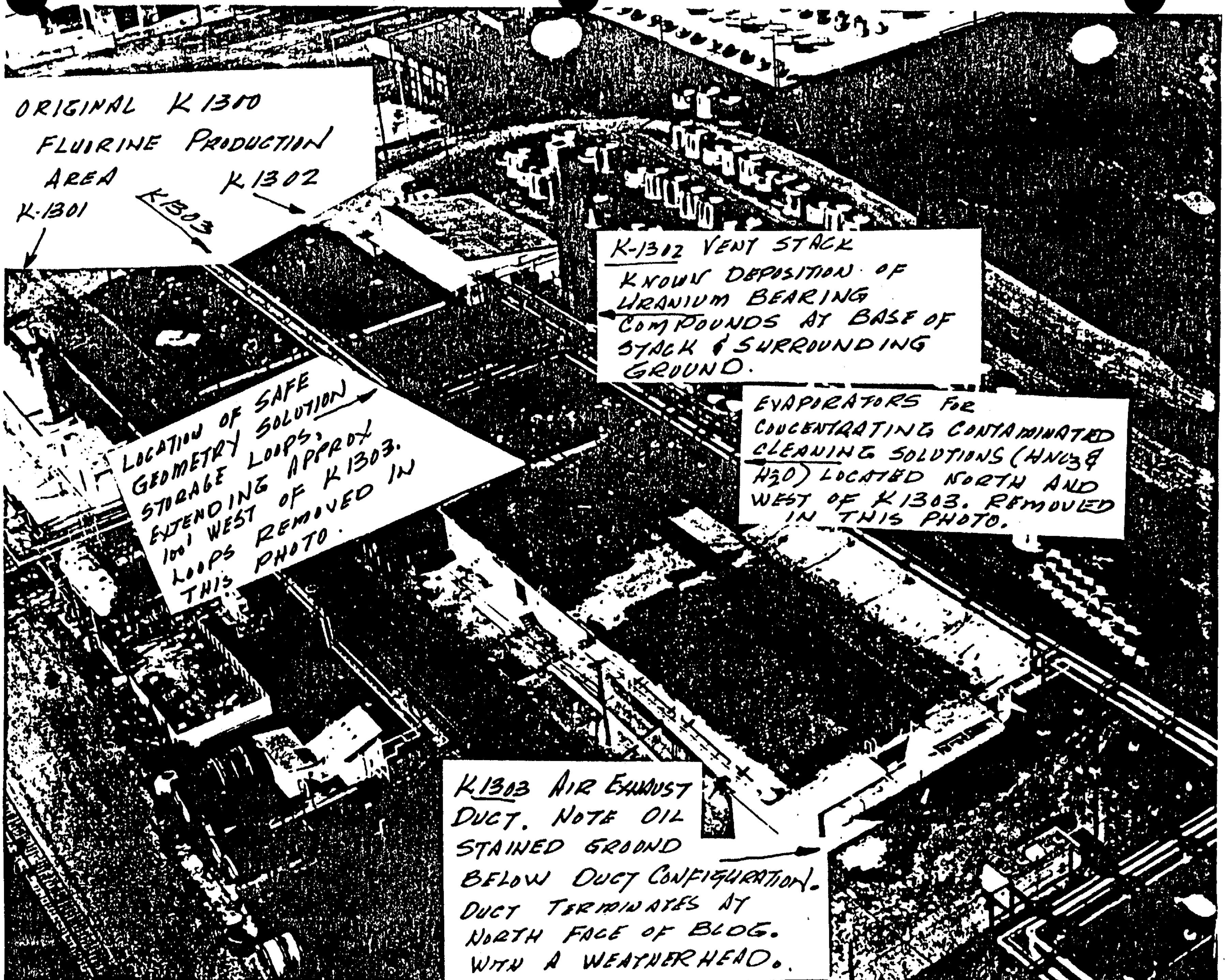
- K-1420 Furnace Stand/Cylinder Conditioning: Effluents from processes were passed through cold traps/KOH scrubbers prior to discharge to K-1302 vent exhaust system.

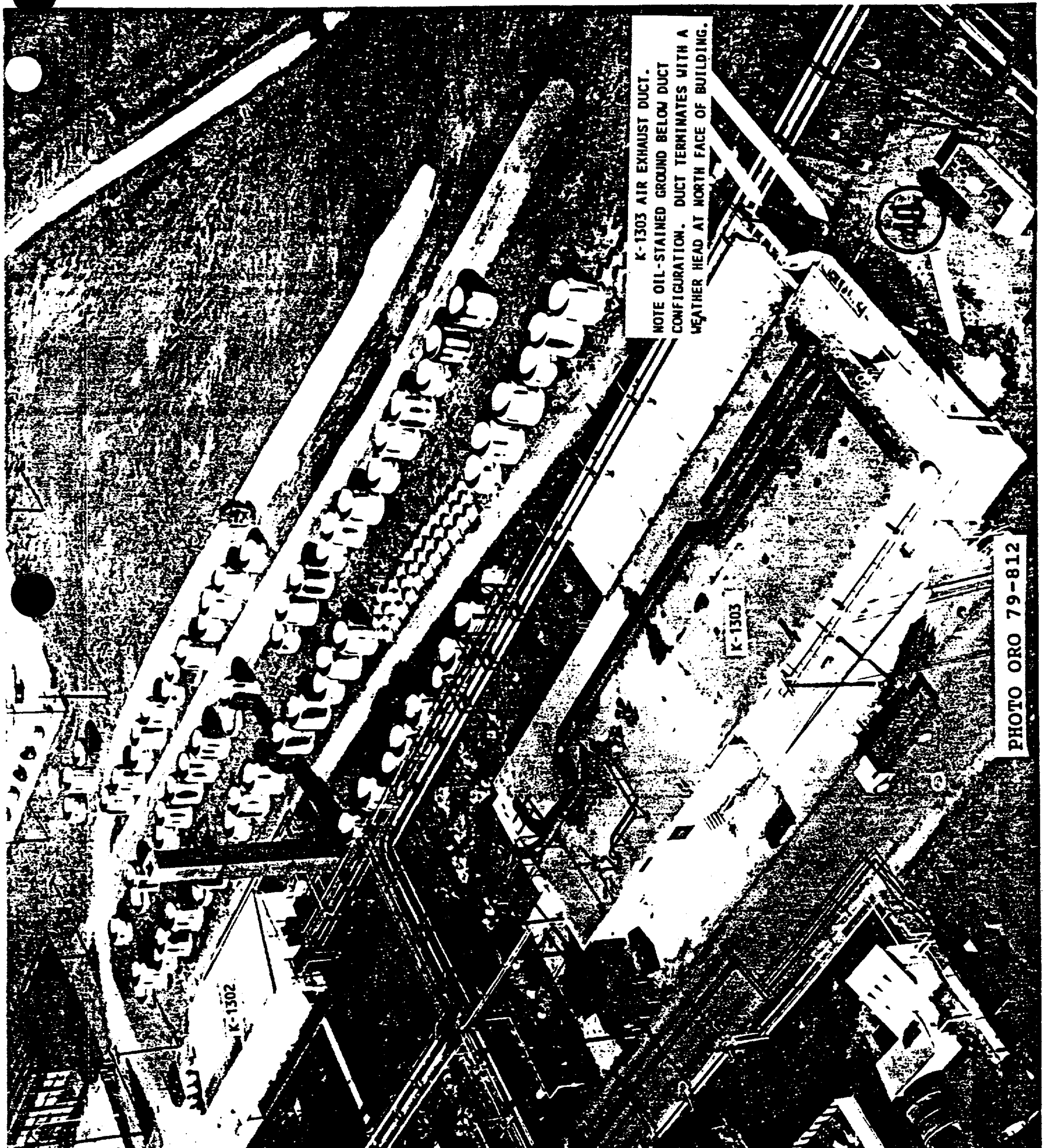
The many years of venting of these K-1301, K-1401, and K-1420 effluents resulted in the deposition of uranium-bearing compounds at the base of the brick stack and its adjoining ground. This specific site is in close proximity of the site formerly occupied by the K-1303 Decontamination Facility-Safe Geometry Solution Storage Loops. For this reason, the K-1302 vent stack site should be integrated into any future K-1303 investigations.

[1] See attached photo ORO 79-812.

The underground drain system that served the mercury cleaning operation in the northeast building section may have residual natural mercury and/or organic mercury compounds that entered the system inadvertently from the mercury cleaning/vacuum distillation operation. This drain system discharged eventually to the K-1407 Holding Pond.


EVAPORATORS FOR CONCENTRATING
CONTAMINATED SOLUTIONS (HNO3 AND H20)
LOCATED NORTH AND WEST OF K-1303.
UNITS REMOVED IN THIS PHOTO.
K-1302 VENT STACK -
KNOWN DEPOSITOR OF URANIUM BEARING
COMPOUNDS AT BASE OF STACK AND
SURROUNDING GROUND.
K-1303
46
K-1302
LOCATION OF SAFE GEOMETRY SOLUTION
STORAGE LOOPS. LOOPS EXTENDED
APPROXIMATELY 100 FT. WEST OF K-1303.
LOOPS REMOVED IN THIS PHOTO.
K-1301
46
ORIGINAL K-1300 FLUORINE PRODUCTION
COMPLEX, CONSISTING OF THE K-1301,
K-1302 AND K-1303 FACILITIES.
PHOTO 79-812


ORIGINAL K 1300
FLUIRINE PRODUCTION
AREA
K-1301
K1303
K 1302
K-1302 VENT STACK
KNOWN DEPOSITION OF
URANIUM BEARING
COMPOUNDS AT BASE OF
STACK & SURROUNDING
GROUND.
EVAPORATORS FOR
CONCENTRATING CONTAMINATED
CLEANING SOLUTIONS (HNO3 &
H2O) LOCATED NORTH AND
WEST OF K1303. REMOVED
IN THIS PHOTO.
LOCATION OF SAFE
GEOMETRY SOLUTION
STORAGE LOOPS.
EXTENDING APPROX
100' WEST OF K1303.
LOOPS REMOVED IN
THIS PHOTO.
K1303 AIR EXHAUST
DUCT. NOTE OIL
STAINED GROUND
BELOW DUCT CONFIGURATION.
DUCT TERMINATES AT
NORTH FACE OF BLDG.
WITH A WEATHERHEAD.


K-1303 AIR EXHAUST DUCT.
NOTE OIL-STAINED GROUND BELOW DUCT CONFIGURATION. DUCT TERMINATES WITH A WEATHER HEAD AT NORTH FACE OF BUILDING.
K-1303
K-1302
PHOTO ORO 79-812

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Unit Name: K-1303 Mercury Distillation and Recovery Unit

Unit Number: R074

Regulatory Status: 3004.u

Area Number/Unit Location: K-25 Site Main Plant Area underneath an K-1303 building extension

Approximate Dimensions and Capacity: The extent of mercury soil contamination is unknown, but is suspected of running the entire length of at least one side of the building.

Dates Operated: 1948-56

Present Function: The mercury distillation and recovery unit is no longer in operation.

Life Cycle Operation: The K-1303 facility has accommodated a variety of major operations, including units for fluorine production, decontamination and recovery of fluorinated lubricating oils, vacuum distillation and recovery of mercury, decontamination of uranium-enrichment process equipment, air model testing and a research compressor.

The Mercury Distillation and Recovery Unit was located in cubicle 2 within the north bay of Building K-1303 prior to a 103 x 31 ft northeast bay being added in 1966. In 1948 the cubicle 2 exhaust system was modified to direct and discharge mercury fumes to the atmosphere above the building's roof.

Waste Characteristics: Mercury, thought to be located primarily under the existing building extension, was the initial concern. A FY 1994 radiation survey identified an additional area of radiological contamination, which has been roped off and posted. Stains on the ground at the northeast corner of the building were tested in FY 1994 and found to contain PCBs at ~3.4 ppm.

Release Data: During a 1991 "walk down" inspection, a former mercury unit worker recalled that globules of mercury used to collect on the ground along the roof's drip line prior to the addition of the northeast wing over the area. The globules may be explained by the presence of the exhaust system installed in 1948 for cubicle 2. The system discharged mercury fumes into the atmosphere above the roof. Some of the fumes may have condensed onto the roof and eventually been washed by rainfall onto the ground alongside the building.

Site Characterization Status: A site inspection is planned for this unit.

Media of Concern: Soil, groundwater, storm drains

Comments:

References:

Surveillance and Maintenance Plan for Inactive Environmental Restoration Remedial Action Sites at the Oak Ridge K-25 Site, Oak Ridge, Tennessee, Revision 2, (K/ER-54/R2). Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, January 16, 1995.

''Exhaust and Water Service for Mercury Stills, Bldg. K-1303,'' Drawing No. AWP-7764-1, Carbide and Carbon Chemicals Corp., May 25, 1948, Revised June 4, 1948.

''Compressor Development Facilities Modifications: Elevations and Details,'' Drawing No. E-S-30967-B, Rev. 1, Union Carbide Corporation Nuclear Division, June 9, 1966.

Date Prepared: May 1991

Date Revised: February 1995

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Unit Name: K-1303 Fluorine Facility

Unit Number: D003c

Regulatory Status: Decontamination and Decommissioning

Unit Location: K-25 Site Main Plant Area, north of K-1401

Approximate Dimensions and Capacity: L-shaped overall, 180 x 88 ft; 13,000 sq ft

Dates Operated: 1944-87

Present Function: Inactive. Compressor test equipment is still stored in the building

Life Cycle Operation: K-1303 was built to house equipment for fluorine liquefaction and vaporization. The area was designed and operated by Hooker Electro-Chemical Company under contract to the Manhattan Engineer District. Fluorine produced in K-1301 was piped to any of 12 cublices on the east half of K-1303, where th product was condensed as a liquid; the collection vessels were periodically operated through a heat cycle in which the liquid fluorine was converted to a pressurized gas that was distributed to K-1302.

After the introduction of diaphragm compressors in K-1301 in 1947, the fluorine liquefaction/vaporization equipment was removed from K-1303, and the area was assigned to new operations. From 1947 to 1956 operations in the east portion of the building included the recovery and stabilization of uranium-contaminated lubricuation oils by filtration and reaction with cobaltic fluoride. Other operations included vacuum distillaton of mercury, oxidation of ammonium diurate in electric furnaces, and various gaseous, solution, and solid uranium sampling operations.

From 1948 to 1955, a converter dismantling and decontaminating facility was installed in the west end of K-1303. This facility had disasembly booths on the southwest side of the building and stainless steel spary booths on the west end. Safe geometry solution storage loops extended approximately 100 ft west of the building. Evaporators were in place at the west end of the storage loops and north of the building for concentrating contaminated cleaning solutions (HNO3 and water) and uranyl nitrate product. Underground condensate drain lines extended from these evaporators east to the K-1407-B Holding Pond.

Following the cessation of decontamination operations in the mid-1950s, the building was used for a research compressor operaion. In the 1960s, other modifications were made to accomodate an air model test operation, which used a type of wind tunnedl as a means for testing internal flow fields using air as the test fluid.

The original portion of K-1303 was built with a concrete support structure. The exterior walls are brick and the interior walls are cinder block. The area now called the test area is a 1966 addition consisting of a steel framework and cinder block exterior walls. The two compressor porches on the east side of the building are enclosed with transite siding.

Waste Characteristics: Mixed chemical and radioactive wastes, including uranium and mercury.

Release Data: Gas releases from this facility would have gone through the K-1300 Brick Stack. Solution leakage from storage loops west of K-1303 may have contaminated the soil in this area. Inadvertant leaks from the decontamination spray booths located in the west end of the building and the solvent extraction uranium recovery system in the southwest quandrant probably contaminated soil underneath this section of the building.

Diffusion cascade compressors used in the air model test facility periodically leaked oil, some of which were discharged throught the atmosphere via the exhaust system. This oil stained area is located near and runs parallel to the east face of the K-1303 facility, descibing a matching vertical projection of the ovehead exhaust duct. Although no toxic or radioactive materials were associated with the air model test facility, the eariler use of this building for decontamination activities raises the concern of latent ground contamination under and outside of K-1303.

Mercury releases are discussed in the K-1303 Mercury Distillation and Recovery Unit report.

Site Characterization Status: This facility is part of the Decontamination and Decommissioning Program.

Media of Concern: Internal building surfaces and equipment.

Comments: This unit is also known as the Research Compressor Building and the Model Test Facility.

References:

''Surveillance and Maintenance Plan for the K-25 Site Decontamination and Decommissioning facilities,'' K/DD-45, December 1992.

Date Prepared: February 1995

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COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

KZ-

PLANT RECORDS DEPT. CENTRAL FILES

B2404

TO Mr. E. D. Flickinger
LOCATION Mr. L. L. Anthony, Jr.

DATE February 24, 1947

ANSWERING LETTER DATE

ATTENTION

COPY TO Mr. G. T. E. Sheldon
Mr. D. R. Cyrus
Plant Records
File

SUBJECT Semi-Monthly Progress Report K-1300 Area

REPORT NO. KZ 5635

Gentlemen:

Following is a report covering conditions and production for the K-1300 Area during the period from 2-1-47 to 2-16-47.

Classification changed to: UNCLASSIFIED
4/15/96
4/16/96

I. Building K-1301

A. Oxide Conversion Unit

1. Balance of Materials Used

	Class B Uranate Ash pounds*	Class B Oxide Ash grams*	Class A Cube Mat'l. grams*	Class M Oxide grams	Class D Oxide grams	Class C Oxide grams
Inventory 1-31-47	265.5	2019	51	1116.0	446.0	0
Received	0	0	0	5502.4	5123.5	1255.4
Shipped	242.6	0	0	0	0	0
On Hand 2-15-47	0	2019	51	6618.4	5569.5	1255.4
Lost by Pulverizing	0.3	--	--	--	--	--

2. Production Balance

Carbide and Carbon Chemicals Corporation, Operating Contractor for the U.S. Atomic Energy Commission.

	Class B Caustic liters*	Class M Caustic liters*	Class D Caustic liters*	Class B TF_6 grams*
Inventory 1-31-47	416	583	596	24,444
Produced	549	0	0	12,604
Shipped	965	583	596	37,048
On Hand 2-15-47	0	0	0	0

This document has been approved for release to the public. 4/19/96 Date. Classification Office, Site

KZ 5635 2 A

* Official weights not available at report time.

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3. Operational Notes

The conversion unit temporarily ceased operations on February 12, due to the following factors:

1. Class A material cannot be fluorinated on an economically justifiable basis.
2. All four reactors must be run in series to obtain a minimum unit consumption of fluorine.

In view of these economic considerations, a stockpile of recovered material of sufficient size in classes B, C, D, or E was not available.

The insulation around each of the cold traps in the conversion room is being repaired.

A crossover has been made on the purge line to this unit which permits the use of dry air instead of nitrogen. This saves about 40 gallons of L-28 per day of operation.

4. Reaction Ratio

F_2 consumed: 196 pounds.
TF6 produced: 12,604 grams (27.8 pounds)
Reaction ratio: 0.142 lbs. TF_6/lb. F_2.

B. F_2 Generation

1. Balance (pounds)

Inventory: 104 Produced: 366* Consumed: 380*
* 28 pounds vented not included.

2. Distribution (pounds)

Oxide Conversion	300 Section	TEC	1400 Section	1300 Section	Labs
196	91	12	73	0	8

3. Chemicals Usage (pounds)

	Received	Charged	Consumed	Inventory
HF	0	0	467	4557
KFHF	0	-	0	0
NaF	0	-	0	375
LiF	0	-	0	140
KOH	330	-	560	330
Dry Ice	6800	-	6300	500
C-716	0	-	44	731

~~SECRET~~

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4. Operational Notes

Thirty-nine items were filled under pressure as follows:

6 portable cylinders, 100 %
1 portable cylinder, 20 %
26 laboratory cylinders.
6 TEC acetelyne type cylinders.

Six laboratory cylinders were purged and evacuated.

The broken valves on five partially filled Harshaw HF cylinders were replaced with 3/4" Kerotest drum type valves.

The C-216 pump purge was changed from G-74 to dry air.

Pens on the Brown instrument chart were re-zeroed as follows:

Storage Tank # 3	0-10	Green Ink
Storage Tank # 4	50-60	Red Ink
Storage Tank # 5	20-30	Purple Ink

The chart scale is the same as before with one division equal to one psig.

The HF cylinders were removed from all four scales in number 2 position to permit the adjustment and necessary repairs of the scales.

One of the six acetelyne type cylinders filled for TEC was not shipped because the diaphragm of the valve ruptured during closing. The cylinder was vented to atmosphere and the damaged valve removed. This acetelyne type cylinder will not be filled in the future. Instead, TEC will be supplied with large portable cylinders similar to those used by Cascade Services.

5. Reaction Ratio

Produced: 366 lbs. F_2.
Consumed: 467 lbs. HF.
Ratio: 1.27 lbs. HF/lb. F_2.

II. Building K-1303

A. Decontamination Unit

1. "T" Increase

Total "T" increase for the period from 2-1-47 to 2-14-47 was 31.40 pounds.

SECRET

2. Shipments

Class A	160.0	pounds in 1983 liters.
Class W-11	6.5	pounds in 3080 liters.
Class D	1.76	pounds in 1567 liters.
Class E	2.6	pounds in 1586 liters.

3. Operational Notes

In addition to normal decontamination work, 55 converter spools were decontaminated. A total of 812 pieces of equipment were handled.

All acetylene type cylinders have been decontaminated.

B. Recovery Unit

1. Balance of Materials

	Sample	Shipped	Received	In Process
T_3O_8 Class M	100 g.	5504 g.	----	----
Solutions Class M	----	----	4975 l.	None
Solutions Class D	----	----	2880 l.	None
Filtrates Class B	----	4254 l.	----	----

2. Operational Notes

The building was cleaned up of Process Development's carbon drums. Empties were shipped out and full ones placed in cubicle number eight. Open top drums were secured for the purpose of holding soda ash and super-cel. The hallway was put in order concerning drums of solution, carboys, chemicals, etc.

C. Mercury Recovery Unit

1. Production Balance

Produced-----------------768 pounds of triple distilled mercury.
Received-----------------929 pounds of dirty mercury.
Shipped------------------480 pounds of triple distilled mercury.
On hand ready to ship----288 pounds of triple distilled mercury.
On hand to be distilled--495 pounds. (Includes approximate weight in still pots.)

SECRET

2. Operational Note

The operator was given instructions to keep his equipment and floor absolutely free of mercury globules and to keep the covers down on the still reservoir pots as much as possible. This is being done.

D. Vacuum Pump Oil Recovery

Work order number D10KZ 179737 has been placed for the extension of the vent duct for the vacuum pump oil recovery process since a considerable amount of trichlorethylene fumes are being given off by the process.

E. C-2144 Recovery Unit

During the first half of the month, approximately 50 gallons of C-2144, which were under specification, were re-run. No laboratory reports on this have arrived as of 2-14-47. Ten samples are in the laboratory.

The vent duct near the ceiling was repaired on 2-14-47. Condensate from the pan evaporators would flow down the sides of the duct and a part of this condensate would make its way between the crimped connection of the duct. It was possible for this water to spoil recovered oil in the filter press. This condition is now eliminated.

There were 415 pounds of Freon-113-oil mixture shipped out.

III. Building K-1408

A. Nitrogen Plant Operations

1. Balance of Material (gallons of L-28)

Inventory: 21,115 Received: 28,166 Consumed: 30,186

2. Distribution of Consumption (gallons of L-28)

	As L-28	As G-74 Pipeline	As G-74 Cylinders
Process Area	12,531	9,195	---
Cond. Bldg.	833	3,425	364
K-1300 Area	---	1,030	5
Laboratories	1,726	---	---
T E C	---	---	626
Evaporation	451	---	---

SECRET

3. Operational Notes

An emergency water line was installed to feed the final heat exchanger with sanitary water in event of an electrical failure. In this way the flow of water under pressure could substitute for the solution circulated by the electrically driven pump.

While unloading Linde tank car SERX 926, a safety valve opened flooding the car with liquid nitrogen which caused the car floor to buckle.

A two-day delay in repairing the warm converter manifold was experienced when all available welders were busy on a converter replacement job in Process Area.

Three full nitrogen cylinders were received from the J. A. Jones Construction Company.
Four Linde tank cars were unloaded.
Nitrogen cylinders filled - 408.

IV. General

The K-1300 Area consumed 30,000 KWH of electricity in this period.

Very truly yours,

HMPreuss

H. M. Preuss
K-1300 Area Technical Supervisor

eee

SECRET

Rep. No. 2370

K/EM-184

SANITIZED VERSION OF CHEMICAL OPERATIONS DEPARTMENT ANNUAL REPORT 1947
(Sanitized Version of CRD Document # K-138)

Compiled by
S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

September 12, 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7314
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

~~S-E-C-R-E-T~~

CONFIDENTIAL AEC RESEARCH AND DEVELOPMENT REPORT

Approved for issue by: W. C. Hartman
Date of issue: February 17, 1948

This document consists of 13 pages.
No. 4 of 32 copies, Series A.

Report No. K-138

CARBIDE AND CARBON CHEMICALS CORPORATION

PROCESS DIVISION

CHEMICAL OPERATIONS DEPARTMENT ANNUAL REPORT 1947

W. C. Hartman

Classification ~~changed~~ to: Remains C-RD
(level and category)
By authority of: CG-PGP-4
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Sam [signature] 5/26/94
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CHEMICAL OPERATIONS DEPARTMENT

ANNUAL REPORT FOR 1947

TABLE OF CONTENTS

7. Oil Recovery Unit: (Cont'd.)

The uranium bearing material is removed from the incoming oil by heating the oil just enough to make it pourable and then filtering through Hyflo-super-cel. This process removes any TF_4 sludges, foreign material, and TF_6 so the temperature of the oil can be maintained below 110°F.

8. Mercury Recovery Unit:

10,345 pounds of mercury was recovered during the past year, maintaining a percentage recovery of 99%. No difficulties in the operation of this unit have been encountered to date. A small loss of mercury results when the triple distilled mercury is given a final drying by allowing the mercury to pass through a column of silica-gel.

9. Lime Floccing:

Lime floccing of weak uranium solutions was one of the next processes developed by the Chemical Operations Department during the past year. Until this process was developed, nothing had been done with these weak solutions. They could not be discarded since they contained more than the allowed "T" content. The process involves passing lime through the solutions and then filtering out the lime and adhered uranium materials. This process was successful in reducing the "T" concentration to less than 1 ppm of uranium for Classes A, B, and C and to ½ ppm for Classes D, E, L, and M. Solutions meeting these low concentration specifications were emptied into the K-1239 pit and/or the pond located north of the K-1300 Area.

9,532.2 grams of "T" was charged into the process as weak solutions of which 8,990.3 grams of "T" was removed in the filter cake. The remaining "T" found in the filtrate met the low "T" content specifications and was subsequently discarded.

10. Personal Cleanliness:

Personal cleanliness requirement of operators has been stressed during the past year. Such cleanliness has necessitated several changes to be made in the area. The K-1409 change house has been rearranged and each operator has been provided a locker for his street clothes plus a locker for his contaminated clothing. Each operator is encouraged to take a shower whenever leaving the area. A Poppy radiation meter has been located in the change house to record the hand counts of all personnel after washing at lunch time and at quitting time.

Drinking fountains have been located in non-operational areas. Safety shoes and coveralls are provided each operator by the company so that contaminated clothing can not be worn home.

Document # 280858 Std

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(This section to be completed by subcontractor requesting document)

J. Lamb
~~[illegible]~~ / 1034A

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Date submitted to ADC 12/14/95

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Date submitted to ChemRisk/Shonka and DOE 3/7/96

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Approved for issue: F. C. Hartman

Date of issue: September 9, 1948

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XP-5, Prt. 2

CARBIDE AND CARBON CHEMICALS CORPORATION

PROCESS DIVISION

CHEMICAL OPERATIONS

Weekly Progress Report for August 30, to September 6, 1948

F. C. Hartman

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K/EM-291

SANITIZED VERSION OF WEEKLY PROGRESS REPORTS AUGUST 30-SEPTEMBER 27, 1948

(SANITIZED VERSION OF CRD DOCUMENT #s KP-5/PTS 2-5)

Compiled by
S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

December 14, 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7314
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

[redacted]

CHEMICAL AREA

Fluorine Plant

Fluorine produced	123 pounds
Consumed by Conversion Unit	35 pounds
Consumed by 300 Section	63 pounds
Consumed by 1400 Section	18 pounds

Nitrogen Plant:

	L-28 (Gallons)	L-28 (Cubic Feet)	G-74 Pipeline (Cubic Feet)	G-74 Cylinders (Cubic Feet)
Process	1891	175,863	301,970	
K-1401	724	67,332	36,270	
Laboratories	954	88,722		
Evaporation	554	51,564		
K-1300 Area			100	
Cylinder Stores				14,920
Y-12				14,675
Totals	4123	383,481	338,340	29,595

Oxide Conversion Unit:

Oxide charged	47,496 grams
TF_6 produced	13,855 grams
Ash produced	10,629 grams
Fluorine used	15,855 grams

Decontamination:

A total of 51 items were decontaminated during the past week. Six (6), Size 3 converters were decontaminated, one (1) of which had to be re-run. Several design changes are being started on the converter Decontamination and Recovery Units.

Mercury Recovery Unit:

160 pounds of distilled mercury are ready to ship. Total mercury shipped to date, 16,139 pounds.

Oil Recovery Unit:

No oil recovery production.

[redacted]

[redacted]

CASCADE SERVICES DEPARTMENT

Leak Testing:

	Cells	Cell C-816 System	Misc. Equip.	AC Pumps	Leaks Found	Bldg. Lines
Vacuum Testing	-	-	-	-	-	-
Pressure Testing	3	2	-	1	2	1
CO_2 Testing	-	-	-	-	-	-
C-816 Testing	-	-	-	-	-	-

Special Materials Handling:

	Cells	Misc.	Discharged and/or Charged	Issued	Visible		Contaminated		
					AC Pumps	Other Equip.	Spills P.G.	Spills Oil	Excess Alpha
C-216 Charging	9	4	-	-	-	-	-	-	-
C-616 Charging	-	-	0 Cyls.	-	-	-	-	-	-
Carbon and Alumina Traps	-	-	17	-	-	-	-	-	-
C-816 Storage	-	-	-	9.2 lbs.	-	-	-	-	-
Field Decont.	-	3	-	-	1	8	2	4	47

General Service

	Service Calls	Valves Purged	Valves Buffered
Purge & Buffer	2	10	10

Special Service or Reports

(a) The usual decontamination, pressure testing, and C-216 charging were required for converter replacement jobs in 3 cells.

(b) No further work done to obsolete mobile tails unit.

[redacted]

FLUOROTHENE PLANT

Raw monomer	1,543.0 pounds
Refined monomer loaded	2,416.5 pounds
Monomer recovered	1,274.0 pounds
Raw Fluorothene	958.5 pounds
Average polymerization	39.5%

The bombs which were conditioned with C-216 have not been improved enough to warrant conditioning all of the reactor bombs.

The new bombs have been completed by the Machine Shop and are now in service. No cores have been removed from the bombs yet, however, it is hoped that they will be cleaner and easier to remove because of the high polish on the inside of these bombs.

The special core which was made for the Fluorocarbon Section of Lab. D, had an N.S.T. of 240°C and polymerized 50% in 5 days. This core had approximately seven (7) times the normal charge of promoter.

PROCESS LABORATORY

I. Chemical Analyses:

Type Samples	Samples	Determinations
C-216 Conditioning	34	34
C-616 Bulb	34	10
Purge Gas (C-616)	12	12
Purge Gas (C-216)	0	0
Dew Point	64	64
Hoke Tube (C-616)	152	0
Bomb from K-631 & K-131 (C-616)	30	0
K-1301 - C-216 Generation	12	12
Totals	338	132

II. Eleven (11) carbon traps were scanned.

RADIATION MONITORING

1. Sixty six (66) Beta-Gamma surveys were made in K-1301 and K-1303.

2. Alpha surface reading and air-borne samples.

   (a) Air-samples, surface and personnel readings were taken during the following seal changes and pump changes:
   K-305-1, C6-2A, K-310-2, C5-7-8-1A-2B-3B-1B-seals. K-301-2-C7-1B and K-301-5, C4-2B pump.

   (b) Surface readings, hand counts and air-samples were taken during the following converter changes:
   K-306-7-C12, K-306-5-C10, and K-305-8-C2.

   (c) Air samples and surface readings were taken in K-131 feed room.

3. 108 Film badges were distributed.

Continued next page

[redacted] [redacted]

RADIATION MONITORING - Continued

SUMMARY:

71 Routine air-samples
78 Special air-samples
1,219 Surface readings
269 Hand counts and personnel readings

Three C-616 releases were monitored during the week of September 1, 1948. A C-616 release occurred in K-131 "A" Bath at 3:55 PM, when line from feed cylinder broke. Air samples were taken approximately 6 feet from break and in center of feed room. Results were below tolerance at 5:15 PM. Surface readings were taken on baths and floor of feed room. Area was evacuated during the release.

On September 3, 1948, at 2:50 PM, a release occurred at K-1303, when two 10" lines that were removed from K-311-1, were delivered to K-1303 for decontamination. These lines contained solidified C-616, on end of which was covered with paper. This end of the line struck the fence, causing the release. Air samples were taken within the release area and surface readings taken on the truck, fence and surrounding ground. The area was evacuated during the release.

On September 5, 1948, a release occurred in K-131 on the "B" Bath. Flexible hose to cylinder broke, causing a small release. Air samples were taken at the "B" Bath and in center of feed room. Room was below tolerance in approximately 15 minutes. After the spill, surface readings were taken on bath and floor of the feed room. The area was evacuated during the release.

W. C. Hartman

W. C. Hartman
Chemical Operations

WCH:gb

[redacted]

[redacted]

Approved for issue: G. T. E. Sheldon
Date of issue: September 16, 1948

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CARBIDE AND CARBON CHEMICALS CORPORATION

PROCESS DIVISION

CHEMICAL OPERATIONS

Weekly Progress Report for September 6, to September 12, 1948

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-1-

CHEMICAL AREA

Fluorine Plant

Fluorine produced	101 pounds
Consumed by Conversion Unit	37 pounds
Consumed by 300 Section	54 pounds
Consumed by 1400 Section	10 pounds

Nitrogen Plant

	L-28 (Gallons)	L-28 (Cubic Feet)	G-74 Pipeline (Cubic Feet)	G-74 Cylinders (Cubic Feet)
Process	2043	189,999	304,560	
K-1401	660	61,380	17,090	
Laboratories	922	85,746		
AEC	14	1,302		
Evaporation	986	91,666		
K-1405			250	
K-1300 Area			70	
Cylinder Stores				6,115
Totals	4,625	430,093	321,970	6,115

Oxide Conversion Unit

Oxide charged	36,450 grams
TF_6 produced	0
Ash produced	12,641 grams
Fluorine used	16,782 grams

Decontamination

A total of 105 items were decontaminated during the past week. Ten (10), size 3 converters were decontaminated. Design changes are being made.

Mercury Recovery Unit

376 pounds of distilled mercury are ready to ship. Total mercury shipped to date, 16,139 pounds.

Oil Recovery Unit

No oil recovery production.

[redacted]

CASCADE SERVICES DEPARTMENT

Leak Testing

	Cells	Cell C-816 System	Misc. Equip.	Ac Pumps	Leaks Found	Bldg. Lines
Vacuum Testing	-	-	-	-	-	-
Pressure Testing	1	2	-	-	3	-
CO_2 Testing	-	-	-	-	-	-

Special Materials Handling

	Cells	Misc.	Discharged and/or Charged	Issued	Visible		Contaminated		
					AC Pumps	Other Equip.	Spills P.G.	Spills Oil	Excess Alpha
C-216 Charging	1	-	-	-	-	-	-	-	-
Carbon and Alumina Traps	-	-	7	-	-	-	-	-	-
C-816 Storage	-	-	-	21,987 lbs.		0	-	-	-
Field Decon.	-	1	-	-	-	4	2	4	39

General Service

	Service Calls	Valves Purged	Valves Buffered
C. C. Backwash	0	-	-
Purge & Buffer	0	-	-

Special Service Reports

(a) Decontamination, pressure testing, and C-216 charging were required for converter replacement job in one cell.

(b) A total of 21,984 gallons of C-816 was pumped from K-300-C to 8 process buildings during the past week.

(c) No further work done to obsolete mobile tails unit.

FLUOROTHENE PLANT

Raw monomer	1,621.0 pounds
Refined monomer loaded	2,323.0 pounds
Monomer recovered	1,106.0 pounds
Raw Fluorothene	969.5 pounds
Average polymerization	40.6 %

1. The cores from the new reactor bombs were very dirty in appearance and hard to remove from the bombs. This was probably due to the absence of any reaction film on the inside of the bombs. There was an excessive amount of reaction between the promoter and the stainless steel surface of the bombs.

2. Work was started toward rebuilding the alcohol recovery still. It should be completed on or about September 17, 1948.

PROCESS LABORATORY

I. Chemical Analyses:

Type Samples	Samples	Determinations
C-216 Conditioning	5	5
C-616 Bulb	2	2
Purge Gas (C-616)	4	4
Purge Gas (C-216)	0	0
Dew Point	25	25
Hoke Tube (C-616)	85	0
Bomb from K-631 & K-131 (C-616)	26	0
Totals	147	36

II. Scans were made on five (5) carbon traps.

III. Two (2) repair jobs were done on sampling buggies.

RADIATION MONITORING

1. Fifty-two (52) Beta-Gamma surveys were made in K-1303 and K-1301.

2. Alpha surface readings and air-borne samples:

   (a) Routine surveys were made in the following locations:

   K-306-7, P. W. - K-1303 - K-1301.

   (b) Air samples, surface and personnel readings were taken during the following seal changes:

   K-302-1-Cell 3, 5B seal, - K-305-3, Cell 2, - 2B seal

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[redacted]

RADIATION MONITORING - cont'd

(c) Surface readings, hand counts and air-samples were taken during the following converter change, K-305-8, Cell 4.

(d) Surface readings on the following trucks for Mr. Ogle:

AE-2552, AE-2562, AE-534 and AE-578.

3. One hundred and eight (108) film badges were distributed.

SUMMARY:

98 Routine air samples
15 Special air samples
2,535 Surface readings
60 Personnel readings and hand counts.

W C Hartman

W. C. Hartman
Chemical Operations

WCH:gb

[redacted]

[redacted]

Approved for issue: G. T. E. Sheldon

Date of issue: September 24, 1948

This document consists of 5 pages
No. 1 of 7 copies. Series A.
Report No. KP-5. Part 4.

CARBIDE AND CARBON CHEMICALS CORPORATION

PROCESS DIVISION

CHEMICAL OPERATIONS

Weekly Progress Report for September 12, to September 19, 1948

W. C. Hartman

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[signature] 20 MAY 94
ADC or ADD signature (first reviewer) Date

Sam P. Whitfield 9/23/94
ADD signature (final reviewer) Date

[redacted]

-12-

[redacted]

CHEMICAL AREA

Fluorine Plant

Fluorine produced	137 pounds
Consumed by Conversion Unit	31 pounds
Consumed by 300 Section	54 pounds
Consumed by 1400 Section	28 pounds

Nitrogen Plant

	L-28 (Gallons)	L-28 (Cubic Feet)	G-74 Pipeline (Cubic Feet)	G-74 Cylinders (Cubic Feet)
Process	1,854	172,422	318,670	
K-1401	669	62,217	62,180	
Laboratories	1,063	98,859		
AEC	21	1,953		
Evaporation	387	35,961		
K-1401			18,920	
K-1300 Area			70	
Cylinder Stores				12,474
Y-12				14,675
Totals	3,994	371,412	399,840	27,149

Oxide Conversion Unit

Oxide charged	34,296 grams
Ash produced	8,149 grams
Fluorine used	14,043 grams

Decontamination Unit

A total of 94 items were decontaminated during the past week. Seventeen (17), size 3 converters were decontaminated.

Mercury Unit

192 pounds of distilled mercury produced this week, making a total of 568 pounds on hand.

Oil Recovery Unit

67 pounds of Light MFL on hand. 34 pounds of MFL, ready to be shipped.

[redacted]

[redacted]

CASCADE SERVICES

(1) Decontamination, pressure testing and C-216 charging were required for a converter replacement job in one (1) cell.

(2) Purging of the obsolete mobile tails unit, K-1410, was resumed with draining of oil and flushing of B-R pumps; openness checks in oil, air and P.G. lines; continous purging and heating, etc. Thus far, over 100 pounds of P.G. has been purged into carbon traps. (This does not include the contaminated oil and solid material which have also been removed.)

(3) The enriched feed charging unit which was moved to K-27 for use by Operations personnel developed a large leak in the heated enclosure. The cell connecting pipe had been removed from the cell prior to disconnecting from the unit and the strain from the weight of the pipe broke the main feed line in the unit. Cascade Services personnel assisted in purging of this unit prior to repairs. Operations personnel are conducting the necessary repairs.

(4) The carbon and alumina storage of Vault 6A has been physically inventoried to check the bookkeeping figures on this material. The actual usage of carbon and alumina varies a great deal from estimated usage figures prepared in September, 1947; however, our supply is sufficient to delay any immediate establishment of order-points on any of this material. However, due to the increased use of soda lime traps, an order-point has been established in the Stores Department for 4- mesh soda lime.

(5) An experimental system for decanting dry C-816 has been set up in the K-300-6 unloading shed, and test runs have been started.

(6) Cascade Services has no spare Infra-Red Analyzers on hand. All spare IRA's have been left in the elctronic shop, K-1024, and are available to Operations personnel from that location instead of being transferred through Cascade Services.

Leak Testing

	Cells	Cell C-816 System	Misc. Equip.	Leaks Found	Bldg. Lines	AC Pumps
Vacuum Testing	-	-	-	-	-	-
Pressure Testing	1	4	5	4	-	-
CO_2 Testing	-	-	-	-	-	-

Special Materials Handling

	Cells	Misc.	Discharged and/or Charged	Issued	Visible Contam. AC Pumps	Other Equip.	Spills P.G.	Oil	Excess Alpha
C-216 Charging	2	-	-	-	-	-	-	-	
Carbon and Alumina Traps	-	-	27	-	-	-	-	-	-
C-816 Storage				1107.5 lbs	-	-	-	-	-
Field Decon.	-	1	-	-	-	1	1	4	51

[redacted]

CASCADE SERVICES - cont'd

General Services

	Coolers	Valves Purged	Valves Buffered
C. C. Backwashing	-	-	-
Valve Purge. & Buff	-	-	-

FLUOROTHENE PLANT

Raw Monomer	677.0 pounds
Refined Monomer loaded	2,124.5 pounds
Monomer recovered	1,030.0 pounds
Raw Fluorothene	984.75 pounds
Average Polymerization	40.9%

The alcohol recovery still has been rebuilt but as yet, the new 100 psig steam line has not been insulated.

Production of raw monomer has been stopped, however, it will take about two more weeks to consume the monomer which is returned to the system via stripping. The last 500 pounds of monomer will be sold to HL-40, for research and experimental purposes at Lab D.

Experimental work is being done to determine procedures for fabricating scrap material which has previously been pressed.

PROCESS LABORATORY

I. Chemical Analyses:

Type Samples	Samples	Determinations
C-216 Conditioning	36	36
C-616 Bulb	32	8
Purge Gas (C-616)	13	13
Purge Gas (C-216)	0	0
Dew Point	74	74
Hoke Tube (C-616)	137	0
Bomb from K-631 & K-131 (C-616)	21	0
C-216 Generation	9	9
	322	140

II. Scans were made for seventeen (17) carbon traps.

III. Two (2) repair jobs were done on sampling buggies.

RADIATION MONITORING

I. Eighty seven (87), Beta-Gamma surveys were made in K-306-7, P.W.

II. Alpha surface readings and air-borne samples:

RADIATION MONITORING - cont'd

(a) Routine surveys were made at the following locations: K-306-7, P.F., - K-1303 and K-131.

(b) Air samples, surface and personnel reading were taken during the following seal changes:
K-310-2, Cell 3, 2B seal - K-303-5, Cell 1, 3B seal - K-303-1, Intersectional Cell, pumps removed, K-312-2, Cell 13, pump 2, bellows changed.

(c) Air samples, surface readings and hand counts were taken during the converter change in K-305-8, Cell 6.

(d) Air samples were taken September 15, 1948, in Area V, line recorder stations. (Inventory)

(e) Surface reading were taken on tools and equipment in K-305-12 tool room.

(f) Surface readings were taken in the maintenance shop at K-302-5.

III. One hundred eight (108) film badges were distributed.

SUMMARY:

119 Routine air samples
38 Special air samples
1,702 Surface readings
348 Hand counts.

W. C. Hartman

W. C. Hartman
Chemical Operations

WCH:gb

~~CONFIDENTIAL~~

[redacted]

Approved for issue: G. T. E. Sheldon

Date of issue: October 1, 1948

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CARBIDE AND CARBON CHEMICALS CORPORATION

PROCESS DIVISION

CHEMICAL OPERATIONS

Weekly Progress Report for September 20, to September 27, 1948

W. C. Hartman

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(classification guide)

20 Aug 84
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ADC / ADD signature (1st reviewer)

Sam W. Wohlfort 5/23/94
Date

[redacted]

[redacted]

CHEMICAL AREA

Fluorine Plant

Fluorine produced	109 pounds
Consumed by Conversion Unit	43 pounds
Consumed by 300 Section	63 pounds
Consumed by 1400 Section	19 pounds

Nitrogen Plant

	L-28 (Gallons)	L-28 (Cubic Feet)	G-74 Pipeline (Cubic Feet)	G-74 Cylinders (Cubic Feet)
Process	2,149	199,857	332,350	
K-1401	732	68,076	56,060	
Laboratories	952	88,536		
Fairchild	14	1,302		
AEC	63	5,859		
Evaporation	253	23,522		
K-1405			8,620	
K-1300 Area			90	
Cylinder Stores				13,453
Y-12				14,675
Totals	4,163	387,152	397,120	28,128

Oxide Conversion Unit

Oxide charged	30,678 grams
Ash produced	10,508 grams
Fluorine used	19,504 grams

Decontamination Unit

A total of 107 items were decontaminated during the past week. Nine (9), size 3 converters were decontaminated.

Mercury Unit

Produced this week	360 pounds
Distilled Mercury on hand	72 pounds
Total shipped	784 pounds

Oil Recovery Unit

C-2144 on hand	52 pounds
MFL on hand	34 pounds
T-MFL on hand	67 pounds

[redacted]

[redacted]

RADIATION MONITORING

1. Sixty eight (68), Beta-Gamma surveys were made in K-1303.

   (a) Twelve (12), Beta-Gamma surveys were made in K-303-4.

   (b) Five (5), Beta-Gamma surveys were made in K-1410.

2. Alpha surface readings and air-borne samples:

   (a) Routine surveys were made at the following locations:
   K-306-7, P.W.
   K-1303 Cubicles.

   (b) Air samples, surface and personnel readings were taken on the following seal and pump changes:
   K-303-4, Cell 4 - 1B and 6B seals
   K-303-4, Cell 4 - 3B pump replacement.

   (c) Air samples, surface readings and personnel checks were taken in K-310-2 & 3, pipe gallery on A normal line.

3. 113 Film badges were distributed.

SUMMARY

87 Routine air samples
35 Special air samples
1,412 Surface readings
945 Personnel readings

PROCESS LABORATORY

I. Chemical Analyses:

Type Samples	Samples	Determinations
C-216 Conditioning	41	41
C-616 Bulb	2	2
Purge Gas (C-616)	28	28
Purge Gas (C-216)	4	4
Dew Point	40	40
Hoke Tube (C-616)	83	0
Bomb from K-631 & K-131 (C-616)	33	00
C-216 Generation	24	24
Totals	255	139

II. One (1) repair job was done on a sampling buggy.

III. One (1) Dew Point meter was constructed and calibrated.

IV. Scans were made on one hundred forty two (142), carbon traps.

[redacted]

[redacted]

FLUOROTHENE PLANT

Raw Monomer	0
Refined Monomer loaded	1,274.0 pounds
Monomer recovered	1,039.0 pounds
Raw Fluorothene	970.25 pounds
Average polymerization	40.9%

The alcohol recovery still was completed and tested. The still has ample heating capacity, however, a larger converter will have to be installed in order to operate with the desired capacity.

The amount of scrap Fluorothene in stores was inventoried and a procedure was developed for refabricating this material into satisfactory sheets. There is enough Fluorothene scrap in stores to supply the normal demand for 18 months if 75% of it is repressed. A report is being prepared discussing this investigation.

CASCADE SERVICES

Leak Testing

	Cells	Cell C-816 System	Bldg. Lines	Misc. Equip.	AC Pumps	Leaks Found
Vacuum Testing	0	0	5	1	0	9
Pressure Testing	0	0	4	8	1	17
CO_2 Testing	0	-	0	-	-	0

Special Materials Handling

					Visible Contam.				
	Cells	Misc.	Discharged and/or Charged	Issued	AC Pumps	Other Equip.	Spills P.G.	Oil	Excess Alpha
C-216 Charging	1	6	-	-	-	-	-	-	-
Carbon and Alumina Traps	-	-	5	-	-	-	-	-	-
C-816 Storage	-	-	-	39 lbs.	-	-	-	-	-
Field Decont.	-	0	-	-	1	4	1	3	27

General Services

	Coolers	Valves Purged	Valves Buffered
C. C. Backwashing	0		
Valve Purg. & Buff.	-	0	28

[redacted]

CASCADE SERVICES - cont'd

Inter-plant Flow Lines:

Work was started on September 22, 1948, to leak test the K-25 and K-27, Inter-plant flow lines. The job involved miscellaneous valve buffering and leak testing and C-216 charging.

Soap testing was done with 10 psig. of dry air in the main pipe lines. Air was admitted from K-27 by connecting the dry air header to the K-402-9 purge header, and blocking off the main K-27, G-74 header.

Time required to pressure a line from vacuum to 0 psig. or from 0 psig. to 10 psig. was approximately 1 hour for each step. Pumping time on each of the four lines varied from 2½ to 4 hours to reach a vacuum of less than 10 microns.

Only one leak was discovered on that portion of the line which is in the field and it was on the B feed. Another major leak on the B feed line was discovered in the valve seats of the K-402-9 block valve. These seats had been previously pressure leak rated with no indication of leakage.

At the close of this report period, Cascade Services is waiting for C-216 negatives on the above lines after which a final acceptance leak rate will be taken.

S.W. Anderson
for W. C. Hartman
Chemical Operations

WCH:gb

[redacted]

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K-25

K/ER-13&D0/DF

OAK RIDGE
K-25 SITE

Remedial Site Evaluation Report on the K-1024 Diluting Pit, Oak Ridge K-25 Site, Oak Ridge, Tennessee

LOCKHEED MARTIN

MANAGED BY
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

UCN-13671 (16 6-95)

DRAFT

K/ER-13&D0/DF

Environmental Restoration Division
K-25 Environmental Restoration Program

Remedial Site Evaluation Report on the K-1024 Diluting Pit, Oak Ridge K-25 Site, Oak Ridge, Tennessee

Date Issued—January 1991

Prepared for
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
under budget and reporting codes CD 10 72 and EW 20

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7101
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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under contract DE-AC05-84OR21400

This document has been approved for release
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Asst Information Officer 11/4/96
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DRAFT

CONTENTS

FIGURES

TABLES

ACRONYMS

EPA	Environment Protection Agency
FFA	Federal Facility Agreement
QA	quality assurance
QC	quality control
RI	Remedial Investigation
VOA	volatile organics analysis

EXECUTIVE SUMMARY

The K-1024 Diluting Pit received wastes from the acid/solvent cleaning areas located in the west wing of Building K-1024. In February 1989, soil from the K-1024 Diluting Pit area was sampled and analyzed for metals and volatile and semivolatile organics. The concentrations of all detected inorganic compounds were below recommended health-based guideline values, with the exception of beryllium and uranium. Although beryllium concentrations exceed guideline values in all samples, the measured concentrations are believed to represent the regional background level. Uranium concentrations exceed background concentrations in one of three soil samples taken near the K-1024 Pit. Because the source of that contamination could not be determined from the sampling conducted to date, a Remedial Investigation in accordance with the anticipated Federal Facility Agreement is recommended.

1. INTRODUCTION

In an effort to locate any additional remedial action sites, areas in which hazardous materials may have been used or stored are currently being evaluated at the Oak Ridge K-25 Site. These evaluations consist of a preliminary sampling of those media most likely to contain residual quantities of hazardous materials, followed by an evaluation of the potential risks posed by the site. Contaminant transport pathways and potential exposure pathways are identified and evaluated qualitatively. Based on the results of this evaluation, either the site is included in the K-25 Environmental Restoration Program, or no further action is recommended. Sites identified as requiring further action will be subject to a Remedial Investigation (RI) in accordance with the anticipated Federal Facility Agreement (FFA). Because the source of uranium concentrations exceeding background levels in one of three soil samples taken near the site could not be determined recommends an RI be conducted on the K-1024 site.

1.1 GEOGRAPHICAL AND HISTORICAL INFORMATION

Building K-1024 is located between Avenue L and Avenue K, near the center of Building K-25 (Fig. 1). The diluting pit is located outside of Building K-1024 and is connected to the building by an acid/solvent drain line (Fig. 2). Another drain line runs from the pit to a catch basin. A third drain line runs from that catch basin, under Avenue L, 7 ft below grade, to a second catch basin. The second catch basin is in the storm drain for Building K-25, and the drain line is 8 ft below grade (Fig. 2). The building was constructed in 1945 and was used until 1963 for the K-25 Site's instrument maintenance shops. Because the maintenance program included cleaning the instruments with acid and solvent solutions, a central acid cleaning area was installed (between 1957 and 1958) in the building's west wing. After the instrument maintenance shops were relocated in 1963, the building was used by the Centrifuge Development Laboratory and the Equipment Test and Inspection Offices. Since 1985, the Filter Test Facility has been located in the building.

1.2 CHARACTERIZATION OF THE CONTAMINANT SOURCE

The instrument maintenance shops used acid and solvent solutions to clean pneumatic pressure transmitters, line recorders, and small valves[1] which were possibly contaminated with metallic elements, primarily UF_6. The resultant waste was discharged to the K-1024 Diluting Pit via an acid/solvent drain line. The wastes from the pit were discharged to the K-25 storm drain system, which parallels Avenue L (Fig. 2), after flowing through the lines described above. Details of this operation appear in Sect. A.2.1 of the K-1024 Sampling Workplan (Appendix A). In an effort to characterize the site for contamination, soil samples were collected and analyzed for metals and volatile and semivolatile organics. Although this process is discussed in detail in the workplan, field activities were not conducted as planned because of obstacles encountered at the site.[2] Details of the actual sampling that occurred are presented in Sect. 2 of this report.

ORNL-DWG 90M-8660

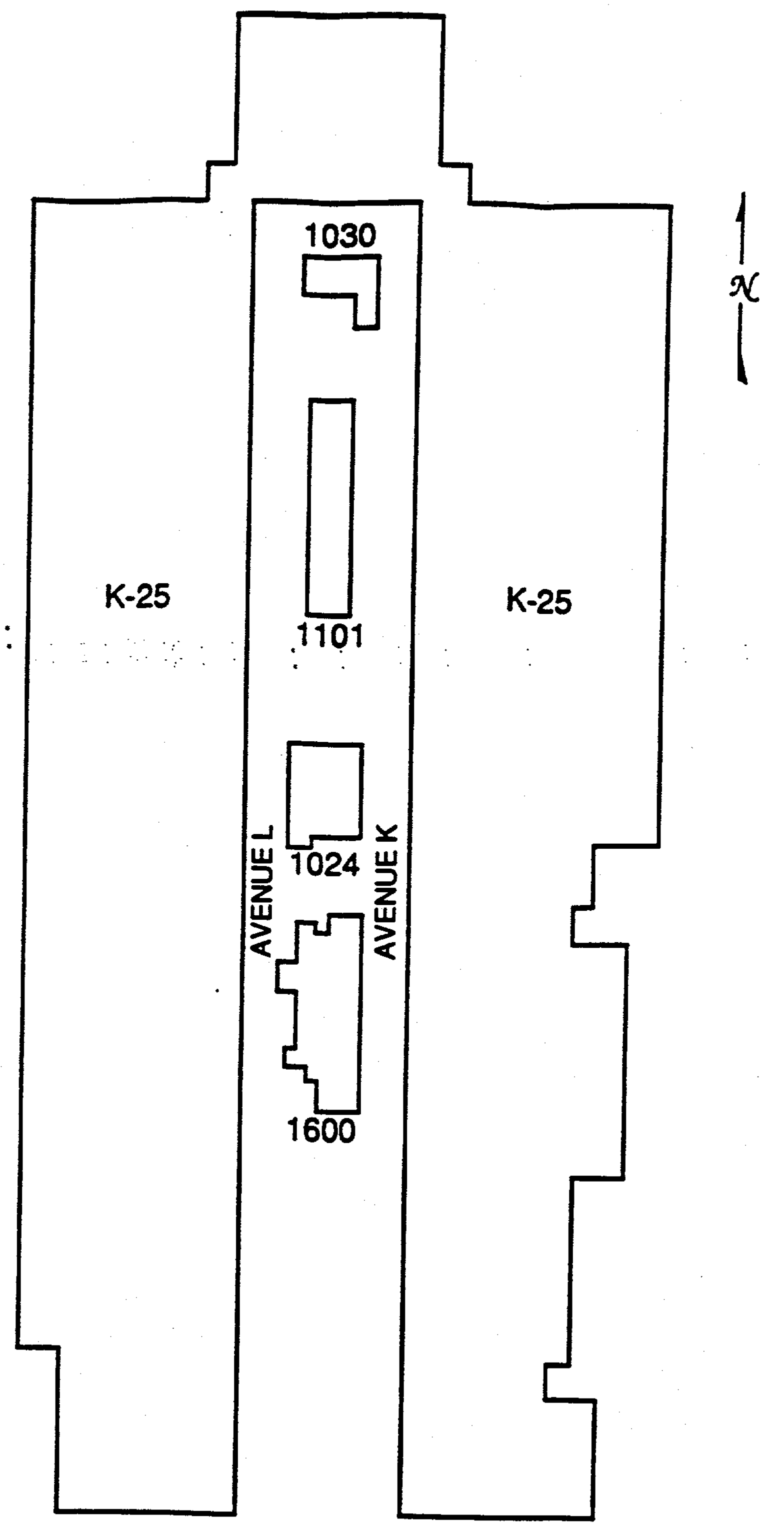

Fig. 1. Location of Building K-1024 at the K-25 Site.

ORNL-DWG 90M-8661R

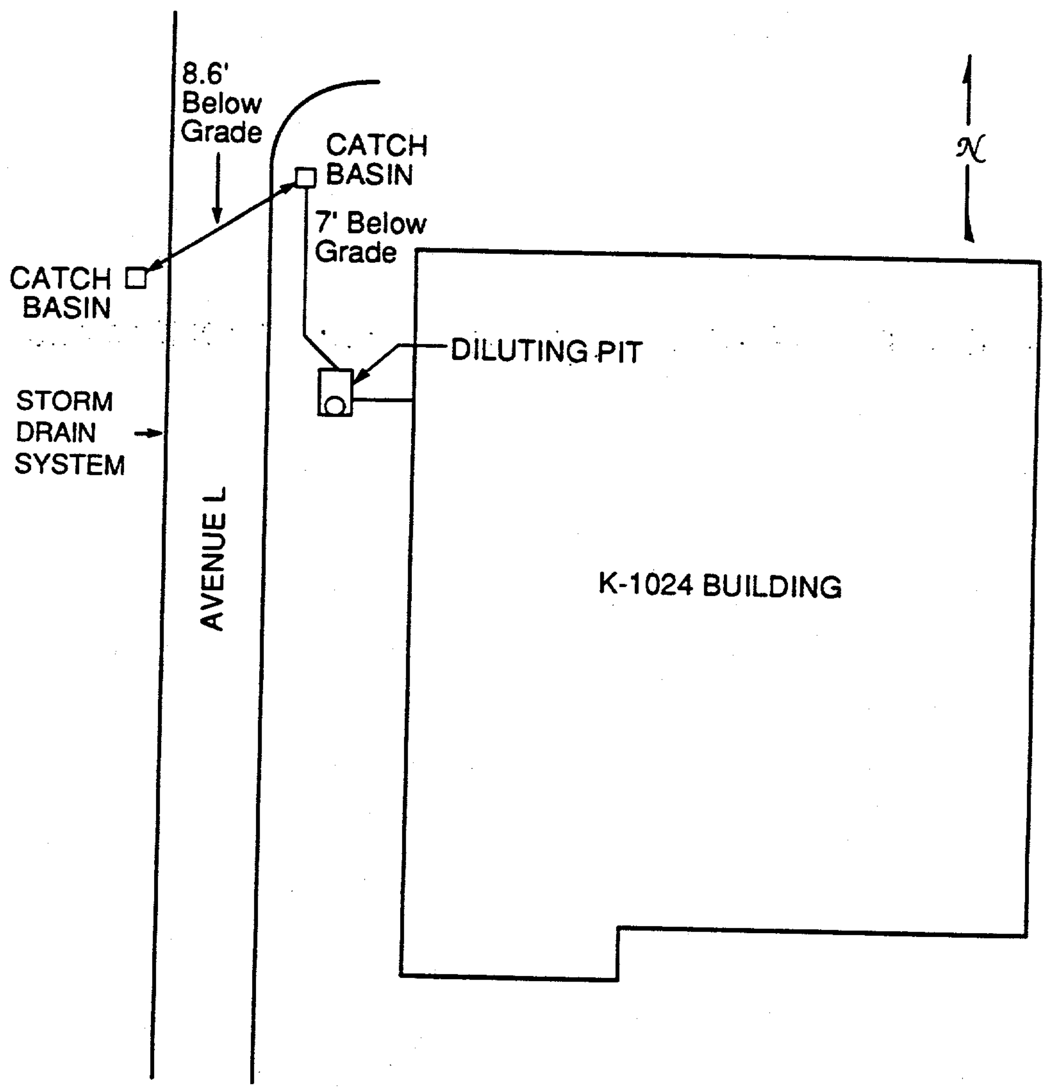

Fig. 2. Location of the acid/solvent drain line.

1.3 ENVIRONMENTAL SETTING

The soil underlying the K-1024 area is a clay-rich residuum derived from weathering of the Chickamauga limestone. Chickamauga limestone consists mainly of thin- to medium-bedded argillaceous limestone interbedded with calcareous shale. However, soils at K-1024 were probably disturbed during the cut-and-fill activities associated with the construction of Building K-25. Such cut-and-fill operations result in variations of soil permeabilities, both spatially and vertically. Details on the subsurface geology of the K-25 site are contained in Chap. 4 of the *RCRA Facility Investigation Plan General Document* (K/HS-132, Rev. 1).[3]

2. SAMPLING AND ANALYTICAL STRATEGY

Information from personnel interviews and historical records served as the basis for the preparation of the sampling workplan. This information indicated that the process drain line in Building K-1024 was used to discharge acids and solvents from the instrument maintenance shops to the K-1024 Diluting Pit prior to their dilution and subsequent release to storm drain SD-240. Because the instruments were often contaminated with metallic elements and subsequently cleaned with organic solvents, the soil samples from the diluting pit area were analyzed for metals and volatile organic compounds.

In order to provide initial estimates of a potential contaminant release in the area of the K-1024 Diluting Pit, six corings were proposed around the diluting pit and associated drain lines (Fig. A.2, Appendix A). Samples were successfully collected from boreholes 1 and 2, but an underground high-voltage electrical line west of Building K-1024 forced relocation of boreholes 3, 4, and 5. Boreholes 3 and 4 were moved to several different locations along the drain line from the pit, but, because of an underlying concrete structure, drilling was never completed. Borehole 6 was successfully drilled at a location southwest of the originally intended location and was relabeled borehole 5; thus, borehole 6 was eliminated. The final sampling locations are indicated in Fig. 3.

3. DATA EVALUATION

Analytical data from the soil sampling conducted at the K-1024 Diluting Pit were compared with the guidelines recommended in Table 2.2 of the *RCRA Facility Investigation Plan General Document*[3] and in Tables 8.6 and 8.7 (where applicable) of the *RCRA Facility Investigation Guidance*, Vol. 1.[4] These guideline values are derived from health-based criteria such as reference doses, carcinogen potency factors, acceptable intakes (subchronic and chronic), and maximum contaminant levels. The health-based criteria are obtained from the Integrated Risk Information System. Compounds for which no health-based guideline values are currently available were compared with naturally occurring concentrations.

ORNL-DWG 90M-8661

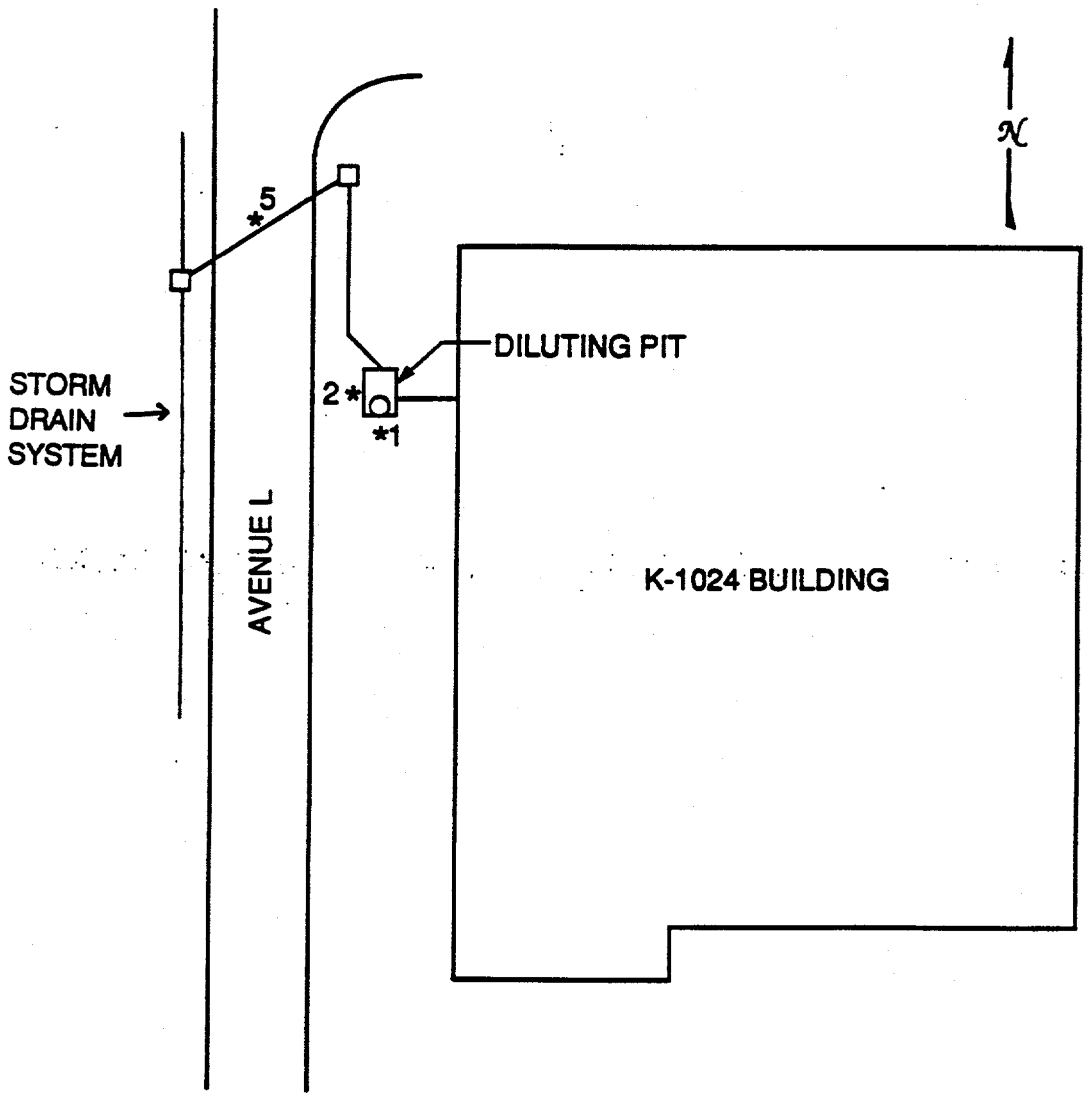

Fig. 3. Locations of boreholes 1, 2, and 5 (indicated by asterisks).

As a result of the data screening, two tables were generated (Tables 1 and 2). Table 1 lists the compounds for which concentrations in the soil at K-1024 exceed recommended guideline values, and Table 2 lists those compounds for which no guideline values have been established. None of the other constituents for which analysis was completed exceed acceptable soil concentrations. A complete listing of the analytical results of the soil sampling is contained in Appendix B.

Beryllium was the only substance present in the soil at K-1024 with concentrations exceeding recommended guideline values. Table 1 lists the mean, minimum, and maximum concentrations of beryllium detected. Although beryllium concentrations (0.44–2.6 mg/kg) exceed the guideline value for all sampling locations, investigation into native soil concentrations has revealed a background level of 2 ppm (average).[5] Thus, the levels of beryllium at the diluting pit are believed to represent regional background concentrations.

Table 2 is a list of compounds without health-based guideline values that were detected in the soil at the K-1024 Diluting Pit, along with their mean, minimum, and maximum concentrations. Also included in the table are background concentrations from several different published sources. Note that uranium is the only constituent listed that does not fall within published background levels. The laboratory analyses of uranium concentrations are summarized in Table 3. The fact that contaminant levels were below detectable limits at all observed depths in boreholes 1 and 2 indicates the probability that no leakage occurred from the tank itself. In borehole 5, contaminant levels below detection in the shallowest sample (1 ft below the drain line) and increasing with depth do not provide sufficient data to indicate the source of contamination or its extent. Consequently, more sampling of the pit and its associated drain lines is recommended.

Table 1. Concentrations of constituents exceeding health-based guideline values in K-1024 Diluting Pit area soil samples

Constituent	Average	Minimum	Maximum	Guideline value	No. of samples exceeding guideline
Beryllium, mg/kg	1.03	0.44	2.6	0.143[a]	9/9

[a]From Table 8.6, *RCRA Facility Investigation Guidance*, Vol. I, EPA 530/SW-031, U.S. Environmental Protection Agency, May 1989.

Table 2. K-1024 soil sample constituents without health-based standards

Constituent	Average (mg/kg)	Minimum (mg/kg)	Maximum (mg/kg)	Background levels (mg/kg)
Aluminum	19,667	14,000	25,000	19,500[a] 10,000–300,000[b] 81,300[c]
Calcium	6,431	100	44,000	300[a] 100–400,000[b] 36,300[c]
Iron	39,333	23,000	58,000	15,000[a] 7,000–550,000[b] 50,000[c]
Magnesium	3,510	990	17,000	1,500[a] 600–6,000[b] 20,900[c]
Uranium	<5	<3	22	1–4[d] 0.9–9.0[b] 1.8[c]

[a]S. W. Maher, *Analysis of Geologic Materials, Boone Lake Area, Tennessee*, State of Tennessee Department of Conservation, Nashville, Tenn., 1973.

[b]J. Dragun, *The Soil Chemistry of Hazardous Materials*, Hazardous Material Control Research Institute, Silver Spring, Md., 1988.

[c]B. Mason, *Principles of Geochemistry*, 3rd ed., John Wiley & Sons, Inc., New York, 1966.

[d]*Handbook on Toxicity of Inorganic Compounds*, ed. H. G. Seiler and H. Sigel, Marcel Dekker, New York, 1988.

Table 3. Uranium contamination

Borehole	Depth (ft)	Concentration (μg/kg)
1	10	<3
	14	<3
	18	<3
2	10	<3
	14	<3
	18	<3
5	8	<3
	11	4.7
	15	22

4. ENVIRONMENTAL AND EXPOSURE PATHWAYS

Once contaminants have been identified at a site, possible scenarios for transport of and subsequent human exposure to these contaminants must be considered to estimate risks (if any) associated with the site. However, because beryllium occurs at regional background levels, a discussion of beryllium contaminant transport pathways leading from the K-1024 Diluting Pit is not necessary. Since additional sampling will be required to determine the source, concentration, and extent of contamination in and around the K-1024 Diluting Pit, transport pathways of uranium contamination will be the subject of future reports.

5. CONCLUSIONS AND RECOMMENDATIONS

At the present time there is insufficient data to determine whether the K-1024 Diluting Pit has been the source of any soil contamination. Beryllium concentrations are within regional background levels, and the source of uranium contamination is unknown. In order to further characterize the source of the uranium contamination, additional sampling and data evaluation of the pit and associated drain lines are recommended. This will require an RI in accordance with the anticipated FFA.

REFERENCES

1. D. S. Pesce, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn., personal communication, December 6 and December 12, 1989.

2. D. Kucsmas, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn., personal communication, November 27, 1989.

3. *RCRA Facility Investigation Plan General Document*, K/HS-132, Rev. 1, Martin Marietta Energy Systems, Inc., Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tenn., May 1989.

4. *RCRA Facility Investigation Guidance*, Vols. I and II, EPA 530/SW-89-031, U.S. Environmental Protection Agency, Washington, D.C., May 1989.

5. S. W. Maher, *Analysis of Geologic Materials, Boone Lake Area, Tennessee*, State of Tennessee Department of Conservation, Nashville, Tenn., 1973.

Appendix A

SAMPLING WORKPLAN FOR THE K-1024 DILUTING PIT
(OCTOBER 1988)

APPENDIX A
SAMPLING WORKPLAN FOR THE K-1024 DILUTING PIT
OCTOBER 1988

A.1. BACKGROUND INFORMATION

This sampling plan addresses the K-1024 Diluting Pit and associated drain lines from Building K-1024 to storm drain SD-240. Building K-1024 is not included in the scope of this sampling plan; however, information about the use of this building is necessary to assess the nature of contaminant release from the diluting pit. The *RCRA Facility Investigation Plan General Document, Oak Ridge Gaseous Diffusion Plant, Oak Ridge, Tennessee* (hereafter referred to as the *General Document*), includes general information applicable to this site and serves as a reference document for this preliminary sampling plan. Included are health and safety procedures to be followed when implementing the sampling plan. Quality control (QC) procedures for remedial actions occurring on the Oak Ridge Reservation are presented in *Environmental Surveillance Procedures Quality Control Program*, Martin Marietta Energy Systems, Inc. (ESH/Sub/87-21706/1), and quality assurance (QA) guidelines for Oak Ridge Gaseous Diffusion Plant (ORGDP) investigations are contained in the *ORGDP Remedial Action Quality Assurance Plan* (K/HS-231). Subsequent to the sampling and analysis activities described in Sect. A.2, the environmental and public health risks associated with possible site contamination may be evaluated. This evaluation will consist of a characterization of contaminant sources, the environmental setting, the magnitude of release, pathways to human exposures, and characterization of risks. Risk assessment data requirements have been incorporated in the development of the site sampling plan, and, based upon preliminary results, risk assessment will be used to determine if further sampling is warranted.

A.1.1 Geographical Information

Building K-1024 and its associated diluting pit are located between Avenue L and Avenue K, near the center of Building K-25 (Fig. A.1). The diluting pit is located outside of the building and is connected to the building via an acid/solvent drain line.

A.1.2 Historical Information

Originally, Building K-1024 was utilized for ORGDP's instrument maintenance shops. Prior to the relocation of the instrument maintenance shops to Building K-1035 in 1963, a central acid cleaning area was installed in the building's west wing. After relocation of the instrument maintenance shops, the building was used for the Centrifuge Development Laboratory and for the Equipment Test and Inspection Offices. Presently, the Filter Test Facility is located in the building.

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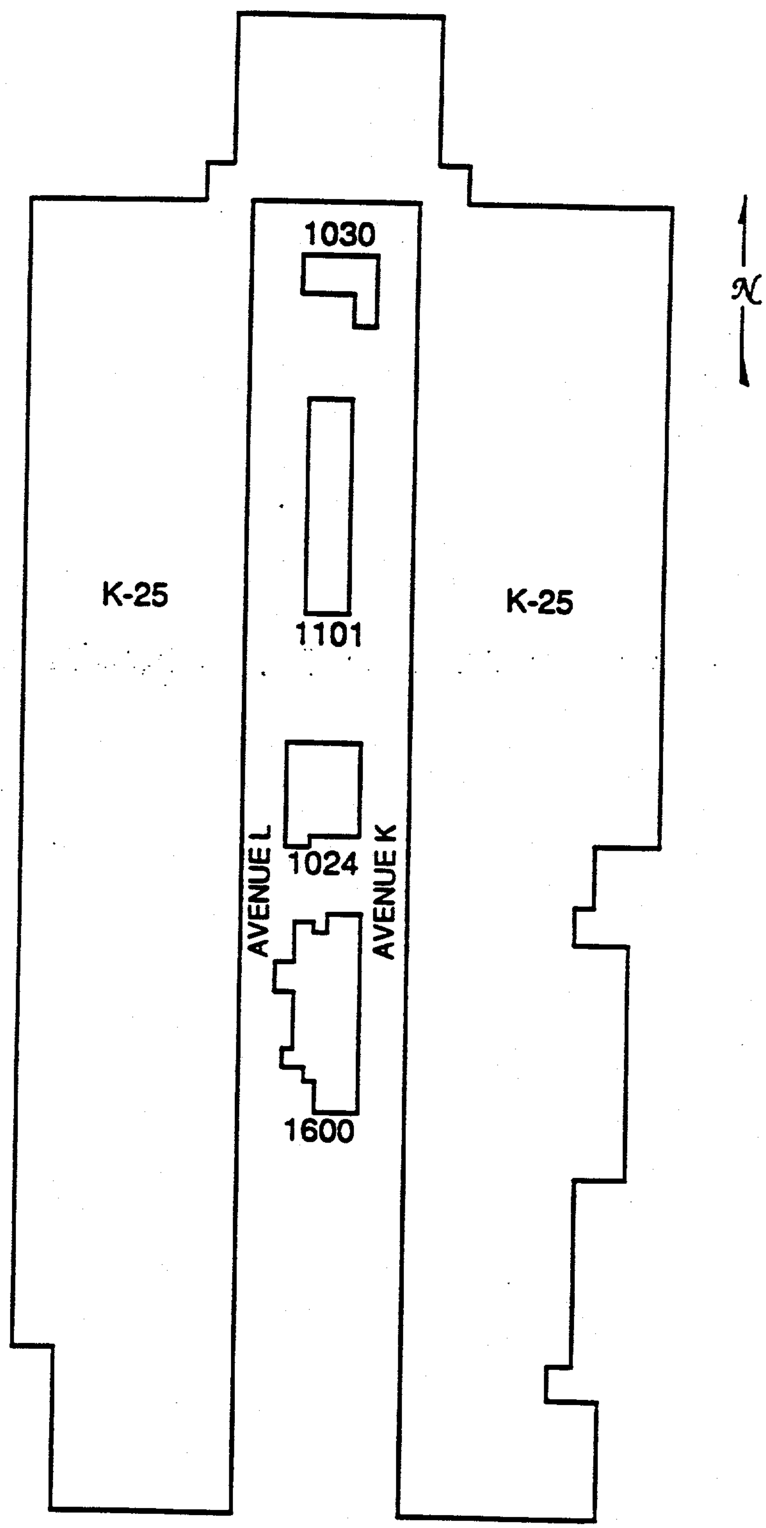

Fig. A.1. Location of Building K-1024 at Oak Ridge Gaseous Diffusion Plant.

A.1.3 Operational Information

The instrument maintenance shop utilized an acid/solvent line which flowed through the K-1024 diluting pit before discharging into the plant's storm drain system. At any one time, the diluting pit held several hundred gallons of water and acid/solvent solutions. When acid/solvent solutions were released to the pit, the line was flushed with water which entered at the head of the waste line. This flushing with water and the subsequent release to the previously diluted solution in the pit were considered to be a satisfactory method of dilution. After the relocation of the maintenance shops, the disposal of acid/solvent solutions to the dilution pit was greatly reduced. Presently, the Filter Test Facility does not utilize any solutions that are considered to be of concern should they enter the building's drains.

A.1.4 Characterization of the Source and Existing Monitoring Data

The nature of the acid/solvent solutions disposed of via the drain lines and the diluting pit and knowledge of the disposal procedures that occurred at the facility suggest that the contaminants, if any, at this site will be either metals or volatile organics. Radioactive contamination at this site is not suspected. No monitoring data exist for this site.

A.2. SAMPLING PLAN

A.2.1 Sampling and Analytical Strategy

Information from personnel interviews serves as the basis for the preparation of this sampling plan. This information indicates that the process drain line in Building K-1024 was used for the discharging of acids and solvents to the K-1024 Diluting Pit prior to their dilution and subsequent release to storm drain SD-240. Thus, the proposed soil samples will be analyzed for metals and volatile organic compounds.

Because the diluting pit is partially underground, samples will be composited beginning at different depths for each of the soil corings. The depth of each coring will be 20 ft. Table A.1 outlines the number of composites to be taken and the depth at which compositing begins. In cases where the 20-ft coring will not be fully utilized for the composites, the remainder of the soil will be archived for possible future use.

A.2.2 Statistical Setup for Sampling

In order to provide initial contamination estimates of a potential contaminant release in the area of the K-1024 Diluting Pit, six corings will be taken around the diluting pit and associated drain lines (Fig. A.2). Each coring will be taken to a depth of ~20 ft.

A.2.3 Field Sampling

A.2.3.1 Site Preparation

Sampling points will be surveyed, as shown in Fig. A.2, and markers will be installed. A drawing will be prepared that references the location of sampling points. For corings that will be located in the road, the asphalt will have to be removed prior to sampling.

Table A.1. Number of composite samples and depth to begin compositing

Sample location	Number of composites (per coring)[a]	Depth to begin compositing
1 and 2	3	Begin composites at 8 ft, one composite sample will be taken every 4 ft to a depth of 20 ft
3 and 4	3	First composite will be taken from 2 ft of soil below the drain line; then two 4-ft composites will be taken for the next 8 ft of soil. Archive the remainder
5 and 6	2	First composite will be taken from 2 ft of soil immediately below the drain line, and the second composite will be taken for the next 4 ft. Archive the remainder

[a]The total number of composite samples to be taken is 16.

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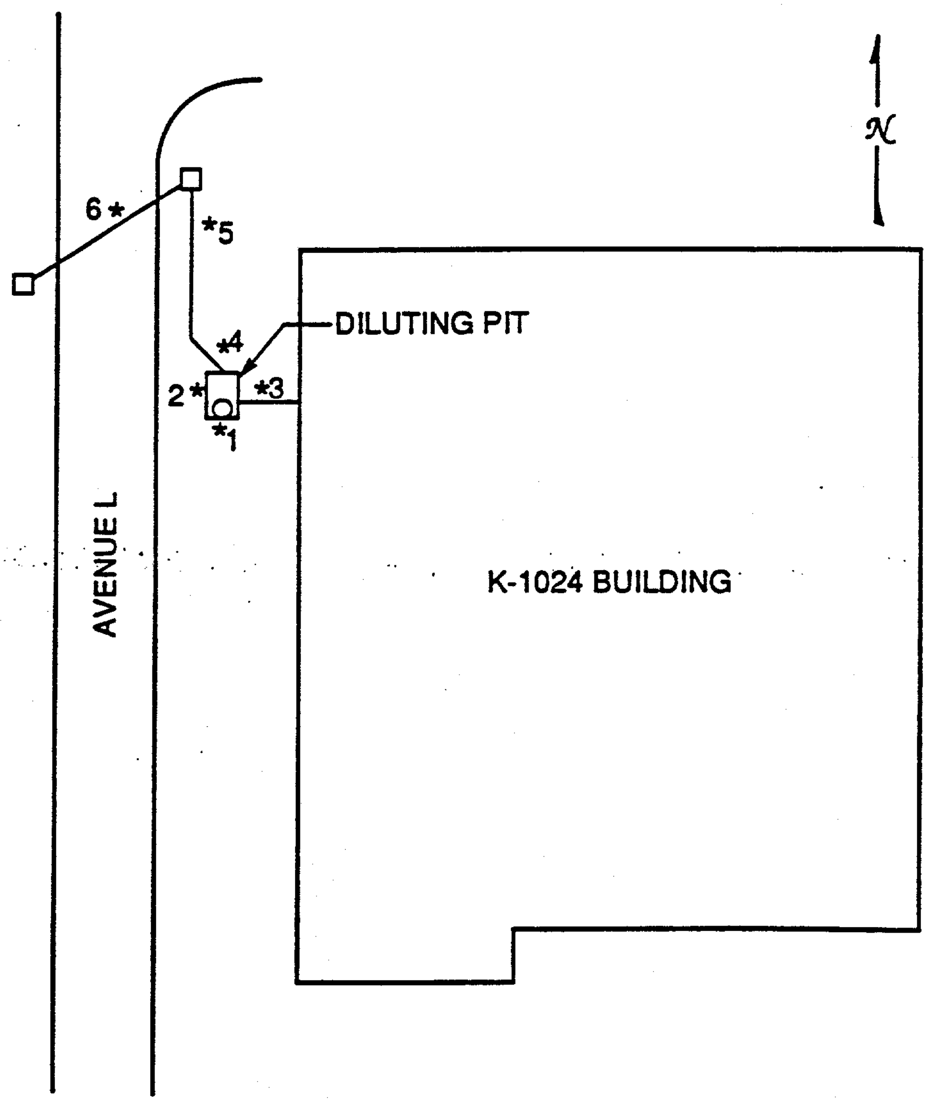

Fig. A.2. Sampling locations at K-1024 (indicated by *).

A.2.3.2 Equipment and Supplies

The drillers will provide all necessary drilling equipment (hollow-core auger, split-barrel sampler, etc.). The following field sampling supplies will be required:

- nonionic detergent, Micro (International Products Corporation);
- deionized water;
- isopropyl alcohol;
- glass containers, precleaned, with Teflon-lined lids, 1-quart capacity;
- bound logbook;
- chain-of-custody seals;
- sample labels;
- chain-of-custody forms;
- stainless steel trays;
- aluminum foil;
- stainless steel spatulas; and
- volatile organic analysis (VOA) bottles.

A.2.3.3 Soil Sampling Procedure

Collection of soil samples from the area will follow American Society for Testing and Materials Method D-1586-84, "Penetration Test Split-Barrel Sampling of Soils." In order to obtain a sample that is undisturbed by the auger operation, a hollow-core auger will be used to remove the soil above each segment to be sampled, and a split-barrel sampler will be driven into the soil through the center of the auger.

The split-barrel sampler will remove samples in 2-ft segments. Samples will be collected to a depth of 20 ft. At each 2-ft increment, the split-barrel sampler will be removed by the drilling crew from the drilling rig and separated to expose the sample.

Between samples, the equipment used for sample transfer will be cleaned with nonionic detergent and water and rinsed with deionized water and isopropyl alcohol. The split-barrel samplers will be cleaned with detergent and rinsed with water by the drilling company.

After samples have been obtained as described in Table A.1, soil from two adjacent coring segments will be combined in a foil-lined stainless steel pan, mixed, and transferred to a precleaned 1-quart jar (sample should fill the jar). The guidelines contained in Sect. 6.2.1 of the *General Document* should be observed during the collection of these samples.

After each coring is complete, the portion of the coring that is contained in the saturated zone will be filled with a grout column to prevent any surface water infiltration into the groundwater. The grouting procedure is contained in Sect. 7.1.3 of the *General Document*. The portions of the corings that are contained in the unsaturated zone will be backfilled with cuttings.

A.2.4 Analytical Protocol and Sample Analysis

An analytical sampling protocol with the following salient features is proposed. There is a possibility for contamination of the site by volatile organics and metals. Samples designated for VOA will be analyzed for the volatile organics listed in Table 7.6 of the *General Document*. Soil samples will be subjected to analysis for the inorganic elements listed in Table 7.4 of the *General Document* (which includes all regulated metals and uranium).

After being received by the analytical laboratory, samples will either be archived, if so designated, or scheduled for the analyses outlined above. Samples designated for VOA analysis will be analyzed by Environment Protection Agency (EPA) Method 8240. Soil sample analyses will follow standard EPA protocol as outlined in *Test Methods for Evaluating Solid Waste* (SW-846, 3rd ed.). The QA/QC requirements outlined in Sect. 7.3 of the *General Document* will be adhered to for all analyses.

Appendix B

SOIL DATA FOR K-1024-DILUTING PIT

Table B.1 Soil data for K-1024 Diluting Pit

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Acetone	890202-036	BH011ASB00	.	<	10	µg/L
Acetone	890202-037	BH012ASE00	.	<	10	µg/L
Acetone	890202-052	BH013ASB00	.	<	10	µg/L
Acetone	890202-030	BH001ASO10	1	<	57	µg/kg
Acetone	890202-031	BH001ASO14	1		66	µg/kg
Acetone	890202-032	BH001ASO18	1	<	66	µg/kg
Acetone	890202-051	BH002ASO18	2	B	96	µg/kg
Acetone	890202-050	BH002ASO14	2	B	740	µg/kg
Acetone	890202-049	BH002ASO10	2	BE	2900	µg/kg
Acetone	890202-034	BH005ASO11	5	J	65	µg/kg
Acetone	890202-033	BH005ASO08	5	B	110	µg/kg
Acetone	890202-035	BH005ASO15	5	B	150	µg/kg
Aluminum	890202-030	BH001ASO10	1		14000	µg/g
Aluminum	890202-031	BH001ASO14	1		20000	µg/g
Aluminum	890202-032	BH001ASO18	1		20000	µg/g
Aluminum	890202-050	BH002ASO14	2		14000	µg/g
Aluminum	890202-049	BH002ASO10	2		19000	µg/g
Aluminum	890202-051	BH002ASO18	2		20000	µg/g
Aluminum	890202-035	BH005ASO15	5		21000	µg/g
Aluminum	890202-033	BH005ASO08	5		24000	µg/g
Aluminum	890202-034	BH005ASO11	5		25000	µg/g
Antimony	890202-037	BH012ASE00	.	<	0.05	mg/L
Antimony	890202-030	BH001ASO10	1	<	5	µg/g
Antimony	890202-031	BH001ASO14	1		8.9	µg/g
Antimony	890202-032	BH001ASO18	1		10	µg/g
Antimony	890202-051	BH002ASO18	2	<	5	µg/g
Antimony	890202-050	BH002ASO14	2		5.5	µg/g
Antimony	890202-049	BH002ASO10	2		8.7	µg/g
Antimony	890202-033	BH005ASO08	5		7	µg/g
Antimony	890202-035	BH005ASO15	5		8	µg/g
Antimony	890202-034	BH005ASO11	5		8.6	µg/g
Arsenic	890202-037	BH012ASE00	.	<	0.05	mg/L
Arsenic	890202-030	BH001ASO10	1	<	5	µg/g
Arsenic	890202-031	BH001ASO14	1	<	5	µg/g
Arsenic	890202-032	BH001ASO18	1	<	5	µg/g
Arsenic	890202-049	BH002ASO10	2	<	5	µg/g
Arsenic	890202-050	BH002ASO14	2	<	5	µg/g
Arsenic	890202-051	BH002ASO18	2	<	5	µg/g
Arsenic	890202-033	BH005ASO08	5	<	5	µg/g
Arsenic	890202-034	BH005ASO11	5	<	5	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Arsenic	890202-035	BH005ASO15	5	<	5	µg/g
Barium	890202-032	BH001ASO18	1		53	µg/g
Barium	890202-031	BH001ASO14	1		59	µg/g
Barium	890202-030	BH001ASO10	1		67	µg/g
Barium	890202-050	BH002ASO14	2		38	µg/g
Barium	890202-051	BH002ASO18	2		52	µg/g
Barium	890202-049	BH002ASO10	2		53	µg/g
Barium	890202-033	BH005ASO08	5		47	µg/g
Barium	890202-034	BH005ASO11	5		57	µg/g
Barium	890202-035	BH005ASO15	5		140	µg/g
Benzene	890202-036	BH011ASB00	.	<	5	µg/L
Benzene	890202-037	BH012ASE00	.	<	5	µg/L
Benzene	890202-052	BH013ASB00	.	<	5	µg/L
Benzene	890202-030	BH001ASO10	1	<	29	µg/kg
Benzene	890202-031	BH001ASO14	1	<	33	µg/kg
Benzene	890202-032	BH001ASO18	1	<	33	µg/kg
Benzene	890202-049	BH002ASO10	2	<	33	µg/kg
Benzene	890202-051	BH002ASO18	2	<	34	µg/kg
Benzene	890202-050	BH002ASO14	2	<	37	µg/kg
Benzene	890202-033	BH005ASO08	5	<	35	µg/kg
Benzene	890202-035	BH005ASO15	5	<	36	µg/kg
Benzene	890202-034	BH005ASO11	5	<	37	µg/kg
Beryllium	890202-032	BH001ASO18	1		0.59	µg/g
Beryllium	890202-030	BH001ASO10	1		1.1	µg/g
Beryllium	890202-031	BH001ASO14	1		2.6	µg/g
Beryllium	890202-050	BH002ASO14	2		0.44	µg/g
Beryllium	890202-051	BH002ASO18	2		0.5	µg/g
Beryllium	890202-049	BH002ASO10	2		1.7	µg/g
Beryllium	890202-033	BH005ASO08	5		0.59	µg/g
Beryllium	890202-034	BH005ASO11	5		0.83	µg/g
Beryllium	890202-035	BH005ASO15	5		0.96	µg/g
Boron	890202-030	BH001ASO10	1		16	µg/g
Boron	890202-032	BH001ASO18	1		17	µg/g
Boron	890202-031	BH001ASO14	1		27	µg/g
Boron	890202-050	BH002ASO14	2		13	µg/g
Boron	890202-051	BH002ASO18	2		17	µg/g
Boron	890202-049	BH002ASO10	2		20	µg/g
Boron	890202-035	BH005ASO15	5		18	µg/g
Boron	890202-033	BH005ASO08	5		21	µg/g
Boron	890202-034	BH005ASO11	5		32	µg/g
Bromodichloromethane	890202-036	BH011ASB00	.	J	3	µg/L
Bromodichloromethane	890202-052	BH013ASB00	.	J	3	µg/L
Bromodichloromethane	890202-037	BH012ASE00	.		8	µg/L
Bromodichloromethane	890202-030	BH001ASO10	1	<	29	µg/kg
Bromodichloromethane	890202-031	BH001ASO14	1	<	33	µg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Quali-fier[b]	Result	Units
Bromodichloromethane	890202-032	BH001ASO18	1	<	33	µg/kg
Bromodichloromethane	890202-049	BH002ASO10	2	<	33	µg/kg
Bromodichloromethane	890202-051	BH002ASO18	2	<	34	µg/kg
Bromodichloromethane	890202-050	BH002ASO14	2	<	37	µg/kg
Bromodichloromethane	890202-033	BH005ASO08	5	<	35	µg/kg
Bromodichloromethane	890202-035	BH005ASO15	5	<	36	µg/kg
Bromodichloromethane	890202-034	BH005ASO11	5	<	37	µg/kg
Bromoform	890202-036	BH011ASB00	.	<	5	µg/L
Bromoform	890202-037	BH012ASE00	.	<	5	µg/L
Bromoform	890202-052	BH013ASB00	.	<	5	µg/L
Bromoform	890202-030	BH001ASO10	1	<	29	µg/kg
Bromoform	890202-031	BH001ASO14	1	<	33	µg/kg
Bromoform	890202-032	BH001ASO18	1	<	33	µg/kg
Bromoform	890202-049	BH002ASO10	2	<	33	µg/kg
Bromoform	890202-051	BH002ASO18	2	<	34	µg/kg
Bromoform	890202-050	BH002ASO14	2	<	37	µg/kg
Bromoform	890202-033	BH005ASO08	5	<	35	µg/kg
Bromoform	890202-035	BH005ASO15	5	<	36	µg/kg
Bromoform	890202-034	BH005ASO11	5	<	37	µg/kg
Bromomethane	890202-036	BH011ASB00	.	<	10	µg/L
Bromomethane	890202-037	BH012ASE00	.	<	10	µg/L
Bromomethane	890202-052	BH013ASB00	.	<	10	µg/L
Bromomethane	890202-030	BH001ASO10	1	<	57	µg/kg
Bromomethane	890202-031	BH001ASO14	1	<	65	µg/kg
Bromomethane	890202-032	BH001ASO18	1	<	66	µg/kg
Bromomethane	890202-049	BH002ASO10	2	<	67	µg/kg
Bromomethane	890202-051	BH002ASO18	2	<	67	µg/kg
Bromomethane	890202-050	BH002ASO14	2	<	75	µg/kg
Bromomethane	890202-033	BH005ASO08	5	<	70	µg/kg
Bromomethane	890202-035	BH005ASO15	5	<	72	µg/kg
Bromomethane	890202-034	BH005ASO11	5	<	73	µg/kg
2-Butanone	890202-036	BH011ASB00	.	<	10	µg/L
2-Butanone	890202-037	BH012ASE00	.	<	10	µg/L
2-Butanone	890202-052	BH013ASB00	.	<	10	µg/L
2-Butanone	890202-030	BH001ASO10	1	<	57	µg/kg
2-Butanone	890202-031	BH001ASO14	1	<	65	µg/kg
2-Butanone	890202-032	BH001ASO18	1	<	66	µg/kg
2-Butanone	890202-049	BH002ASO10	2	<	67	µg/kg
2-Butanone	890202-051	BH002ASO18	2	<	67	µg/kg
2-Butanone	890202-050	BH002ASO14	2	<	75	µg/kg
2-Butanone	890202-033	BH005ASO08	5	<	70	µg/kg
2-Butanone	890202-035	BH005ASO15	5	<	72	µg/kg
2-Butanone	890202-034	BH005ASO11	5	<	73	µg/kg
Cadmium	890202-032	BH001ASO18	1		1.3	µg/g
Cadmium	890202-030	BH001ASO10	1		1.7	µg/g
Cadmium	890202-031	BH001ASO14	1		2.4	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Cadmium	890202-051	BH002ASO18	2		0.71	μg/g
Cadmium	890202-050	BH002ASO14	2		0.98	μg/g
Cadmium	890202-049	BH002ASO10	2		1.7	μg/g
Cadmium	890202-033	BH005ASO08	5		1.5	μg/g
Cadmium	890202-035	BH005ASO15	5		1.5	μg/g
Cadmium	890202-034	BH005ASO11	5		1.6	μg/g
Calcium	890202-032	BH001ASO18	1		800	μg/g
Calcium	890202-031	BH001ASO14	1		2700	μg/g
Calcium	890202-030	BH001ASO10	1		44000	μg/g
Calcium	890202-051	BH002ASO18	2		100	μg/g
Calcium	890202-049	BH002ASO10	2		2500	μg/g
Calcium	890202-050	BH002ASO14	2		5700	μg/g
Calcium	890202-035	BH005ASO15	5		340	μg/g
Calcium	890202-033	BH005ASO08	5		540	μg/g
Calcium	890202-034	BH005ASO11	5		1200	μg/g
Carbon disulfide	890202-036	BH011ASB00	.	<	5	μg/L
Carbon disulfide	890202-037	BH012ASE00	.	<	5	μg/L
Carbon disulfide	890202-052	BH013ASB00	.	<	5	μg/L
Carbon disulfide	890202-030	BH001ASO10	1	<	29	μg/kg
Carbon disulfide	890202-031	BH001ASO14	1	<	33	μg/kg
Carbon disulfide	890202-032	BH001ASO18	1	<	33	μg/kg
Carbon disulfide	890202-049	BH002ASO10	2	<	33	μg/kg
Carbon disulfide	890202-051	BH002ASO18	2	<	34	μg/kg
Carbon disulfide	890202-050	BH002ASO14	2	<	37	μg/kg
Carbon disulfide	890202-033	BH005ASO08	5	<	35	μg/kg
Carbon disulfide	890202-035	BH005ASO15	5	<	36	μg/kg
Carbon disulfide	890202-034	BH005ASO11	5	<	37	μg/kg
Carbon tetrachloride	890202-036	BH011ASB00	.	<	5	μg/L
Carbon tetrachloride	890202-037	BH012ASE00	.	<	5	μg/L
Carbon tetrachloride	890202-052	BH013ASB00	.	<	5	μg/L
Carbon tetrachloride	890202-030	BH001ASO10	1	<	29	μg/kg
Carbon tetrachloride	890202-031	BH001ASO14	1	<	33	μg/kg
Carbon tetrachloride	890202-032	BH001ASO18	1	<	33	μg/kg
Carbon tetrachloride	890202-049	BH002ASO10	2	<	33	μg/kg
Carbon tetrachloride	890202-051	BH002ASO18	2	<	34	μg/kg
Carbon tetrachloride	890202-050	BH002ASO14	2	<	37	μg/kg
Carbon tetrachloride	890202-033	BH005ASO08	5	<	35	μg/kg
Carbon tetrachloride	890202-035	BH005ASO15	5	<	36	μg/kg
Carbon tetrachloride	890202-034	BH005ASO11	5	<	37	μg/kg
Chlorobenzene	890202-036	BH011ASB00	.	<	5	μg/L
Chlorobenzene	890202-037	BH012ASE00	.	<	5	μg/L
Chlorobenzene	890202-052	BH013ASB00	.	<	5	μg/L
Chlorobenzene	890202-030	BH001ASO10	1	<	29	μg/kg
Chlorobenzene	890202-031	BH001ASO14	1	<	33	μg/kg
Chlorobenzene	890202-032	BH001ASO18	1	<	33	μg/kg
Chlorobenzene	890202-049	BH002ASO10	2	<	33	μg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Chlorobenzene	890202-051	BH002ASO18	2	<	34	µg/kg
Chlorobenzene	890202-050	BH002ASO14	2	<	37	µg/kg
Chlorobenzene	890202-033	BH005ASO08	5	<	35	µg/kg
Chlorobenzene	890202-035	BH005ASO15	5	<	36	µg/kg
Chlorobenzene	890202-034	BH005ASO11	5	<	37	µg/kg
Chloroethane	890202-036	BH011ASB00	.	<	10	µg/L
Chloroethane	890202-037	BH012ASE00	.	<	10	µg/L
Chloroethane	890202-052	BH013ASB00	.	<	10	µg/L
Chloroethane	890202-030	BH001ASO10	1	<	57	µg/kg
Chloroethane	890202-031	BH001ASO14	1	<	65	µg/kg
Chloroethane	890202-032	BH001ASO18	1	<	66	µg/kg
Chloroethane	890202-049	BH002ASO10	2	<	67	µg/kg
Chloroethane	890202-051	BH002ASO18	2	<	67	µg/kg
Chloroethane	890202-050	BH002ASO14	2	<	75	µg/kg
Chloroethane	890202-033	BH005ASO08	5	<	70	µg/kg
Chloroethane	890202-035	BH005ASO15	5	<	72	µg/kg
Chloroethane	890202-034	BH005ASO11	5	<	73	µg/kg
Chloroform	890202-036	BH011ASB00	.		35	µg/L
Chloroform	890202-052	BH013ASB00	.		36	µg/L
Chloroform	890202-037	BH012ASE00	.		48	µg/L
Chloroform	890202-031	BH001ASO14	1	J	6	µg/kg
Chloroform	890202-030	BH001ASO10	1	<	29	µg/kg
Chloroform	890202-032	BH001ASO18	1	<	33	µg/kg
Chloroform	890202-049	BH002ASO10	2	<	33	µg/kg
Chloroform	890202-051	BH002ASO18	2	<	34	µg/kg
Chloroform	890202-050	BH002ASO14	2	<	37	µg/kg
Chloroform	890202-034	BH005ASO11	5	J	5	µg/kg
Chloroform	890202-033	BH005ASO08	5	<	35	µg/kg
Chloroform	890202-035	BH005ASO15	5	<	36	µg/kg
Chloromethane	890202-036	BH011ASB00	.	<	10	µg/L
Chloromethane	890202-037	BH012ASE00	.	<	10	µg/L
Chloromethane	890202-052	BH013ASB00	.	<	10	µg/L
Chloromethane	890202-030	BH001ASO10	1	<	57	µg/kg
Chloromethane	890202-031	BH001ASO14	1	<	65	µg/kg
Chloromethane	890202-032	BH001ASO18	1	<	66	µg/kg
Chloromethane	890202-049	BH002ASO10	2	<	67	µg/kg
Chloromethane	890202-051	BH002ASO18	2	<	67	µg/kg
Chloromethane	890202-050	BH002ASO14	2	<	75	µg/kg
Chloromethane	890202-033	BH005ASO08	5	<	70	µg/kg
Chloromethane	890202-035	BH005ASO15	5	<	72	µg/kg
Chloromethane	890202-034	BH005ASO11	5	<	73	µg/kg
Chromium	890202-030	BH001ASO10	1		12	µg/g
Chromium	890202-031	BH001ASO14	1		19	µg/g
Chromium	890202-032	BH001ASO18	1		28	µg/g
Chromium	890202-051	BH002ASO18	2		24	µg/g
Chromium	890202-049	BH002ASO10	2		25	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Chromium	890202-050	BH002ASO14	2		29	µg/g
Chromium	890202-035	BH005ASO15	5		16	µg/g
Chromium	890202-033	BH005ASO08	5		20	µg/g
Chromium	890202-034	BH005ASO11	5		24	µg/g
Cobalt	890202-030	BH001ASO10	1		25	µg/g
Cobalt	890202-032	BH001ASO18	1		35	µg/g
Cobalt	890202-031	BH001ASO14	1		48	µg/g
Cobalt	890202-051	BH002ASO18	2		10	µg/g
Cobalt	890202-050	BH002ASO14	2		15	µg/g
Cobalt	890202-049	BH002ASO10	2		22	µg/g
Cobalt	890202-033	BH005ASO08	5		35	µg/g
Cobalt	890202-034	BH005ASO11	5		68	µg/g
Cobalt	890202-035	BH005ASO15	5		110	µg/g
Copper	890202-032	BH001ASO18	1		20	µg/g
Copper	890202-030	BH001ASO10	1		44	µg/g
Copper	890202-031	BH001ASO14	1		68	µg/g
Copper	890202-050	BH002ASO14	2		13	µg/g
Copper	890202-051	BH002ASO18	2		16	µg/g
Copper	890202-049	BH002ASO10	2		37	µg/g
Copper	890202-033	BH005ASO08	5		19	µg/g
Copper	890202-035	BH005ASO15	5		19	µg/g
Copper	890202-034	BH005ASO11	5		25	µg/g
Dibromochloromethane	890202-036	BH011ASB00	.	<	5	µg/L
Dibromochloromethane	890202-037	BH012ASE00	.	<	5	µg/L
Dibromochloromethane	890202-052	BH013ASB00	.	<	5	µg/L
Dibromochloromethane	890202-030	BH001ASO10	1	<	29	µg/kg
Dibromochloromethane	890202-031	BH001ASO14	1	<	33	µg/kg
Dibromochloromethane	890202-032	BH001ASO18	1	<	33	µg/kg
Dibromochloromethane	890202-049	BH002ASO10	2	<	33	µg/kg
Dibromochloromethane	890202-051	BH002ASO18	2	<	34	µg/kg
Dibromochloromethane	890202-050	BH002ASO14	2	<	37	µg/kg
Dibromochloromethane	890202-033	BH005ASO08	5	<	35	µg/kg
Dibromochloromethane	890202-035	BH005ASO15	5	<	36	µg/kg
Dibromochloromethane	890202-034	BH005ASO11	5	<	37	µg/kg
1,1-Dichloroethane	890202-036	BH011ASB00	.	<	5	µg/L
1,1-Dichloroethane	890202-037	BH012ASE00	.	<	5	µg/L
1,1-Dichloroethane	890202-052	BH013ASB00	.	<	5	µg/L
1,1-Dichloroethane	890202-030	BH001ASO10	1	<	29	µg/kg
1,1-Dichloroethane	890202-031	BH001ASO14	1	<	33	µg/kg
1,1-Dichloroethane	890202-032	BH001ASO18	1	<	33	µg/kg
1,1-Dichloroethane	890202-049	BH002ASO10	2	<	33	µg/kg
1,1-Dichloroethane	890202-051	BH002ASO18	2	<	34	µg/kg
1,1-Dichloroethane	890202-050	BH002ASO14	2	<	37	µg/kg
1,1-Dichloroethane	890202-033	BH005ASO08	5	<	35	µg/kg
1,1-Dichloroethane	890202-035	BH005ASO15	5	<	36	µg/kg
1,1-Dichloroethane	890202-034	BH005ASO11	5	<	37	µg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
1,2-Dichloroethane	890202-036	BH011ASB00	.	<	5	µg/L
1,2-Dichloroethane	890202-037	BH012ASE00	.	<	5	µg/L
1,2-Dichloroethane	890202-052	BH013ASB00	.	<	5	µg/L
1,2-Dichloroethane	890202-030	BH001ASO10	1	<	29	µg/kg
1,2-Dichloroethane	890202-031	BH001ASO14	1	<	33	µg/kg
1,2-Dichloroethane	890202-032	BH001ASO18	1	<	33	µg/kg
1,2-Dichloroethane	890202-049	BH002ASO10	2	<	33	µg/kg
1,2-Dichloroethane	890202-051	BH002ASO18	2	<	34	µg/kg
1,2-Dichloroethane	890202-050	BH002ASO14	2	<	37	µg/kg
1,2-Dichloroethane	890202-033	BH005ASO08	5	<	35	µg/kg
1,2-Dichloroethane	890202-035	BH005ASO15	5	<	36	µg/kg
1,2-Dichloroethane	890202-034	BH005ASO11	5	<	37	µg/kg
1,1-Dichloroethene	890202-036	BH011ASB00	.	<	5	µg/L
1,1-Dichloroethene	890202-037	BH012ASE00	.	<	5	µg/L
1,1-Dichloroethene	890202-052	BH013ASB00	.	<	5	µg/L
1,1-Dichloroethene	890202-030	BH001ASO10	1	<	29	µg/kg
1,1-Dichloroethene	890202-031	BH001ASO14	1	<	33	µg/kg
1,1-Dichloroethene	890202-032	BH001ASO18	1	<	33	µg/kg
1,1-Dichloroethene	890202-049	BH002ASO10	2	<	33	µg/kg
1,1-Dichloroethene	890202-051	BH002ASO18	2	<	34	µg/kg
1,1-Dichloroethene	890202-050	BH002ASO14	2	<	37	µg/kg
1,1-Dichloroethene	890202-033	BH005ASO08	5	<	35	µg/kg
1,1-Dichloroethene	890202-035	BH005ASO15	5	<	36	µg/kg
1,1-Dichloroethene	890202-034	BH005ASO11	5	<	37	µg/kg
1,2-Dichloroethene (total)	890202-036	BH011ASB00	.	<	5	µg/L
1,2-Dichloroethene (total)	890202-037	BH012ASE00	.	<	5	µg/L
1,2-Dichloroethene (total)	890202-052	BH013ASB00	.	<	5	µg/L
1,2-Dichloroethene (total)	890202-030	BH001ASO10	1	<	29	µg/kg
1,2-Dichloroethene (total)	890202-031	BH001ASO14	1	<	33	µg/kg
1,2-Dichloroethene (total)	890202-032	BH001ASO18	1	<	33	µg/kg
1,2-Dichloroethene (total)	890202-049	BH002ASO10	2	<	33	µg/kg
1,2-Dichloroethene (total)	890202-051	BH002ASO18	2	<	34	µg/kg
1,2-Dichloroethene (total)	890202-050	BH002ASO14	2	<	37	µg/kg
1,2-Dichloroethene (total)	890202-033	BH005ASO08	5	<	35	µg/kg
1,2-Dichloroethene (total)	890202-035	BH005ASO15	5	<	36	µg/kg
1,2-Dichloroethene (total)	890202-034	BH005ASO11	5	<	37	µg/kg
1,2-Dichloropropane	890202-036	BH011ASB00	.	<	5	µg/L
1,2-Dichloropropane	890202-037	BH012ASE00	.	<	5	µg/L
1,2-Dichloropropane	890202-052	BH013ASB00	.	<	5	µg/L
1,2-Dichloropropane	890202-030	BH001ASO10	1	<	29	µg/kg
1,2-Dichloropropane	890202-031	BH001ASO14	1	<	33	µg/kg
1,2-Dichloropropane	890202-032	BH001ASO18	1	<	33	µg/kg
1,2-Dichloropropane	890202-049	BH002ASO10	2	<	33	µg/kg
1,2-Dichloropropane	890202-051	BH002ASO18	2	<	34	µg/kg
1,2-Dichloropropane	890202-050	BH002ASO14	2	<	37	µg/kg
1,2-Dichloropropane	890202-033	BH005ASO08	5	<	35	µg/kg
1,2-Dichloropropane	890202-035	BH005ASO15	5	<	36	µg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Quali-fier[b]	Result	Units
1,2-Dichloropropane	890202-034	BH005ASO11	5	<	37	µg/kg
cis-1,3-Dichloropropene	890202-036	BH011ASB00	.	<	5	µg/L
cis-1,3-Dichloropropene	890202-037	BH012ASE00	.	<	5	µg/L
cis-1,3-Dichloropropene	890202-052	BH013ASB00	.	<	5	µg/L
cis-1,3-Dichloropropene	890202-030	BH001ASO10	1	<	29	µg/kg
cis-1,3-Dichloropropene	890202-031	BH001ASO14	1	<	33	µg/kg
cis-1,3-Dichloropropene	890202-032	BH001ASO18	1	<	33	µg/kg
cis-1,3-Dichloropropene	890202-049	BH002ASO10	2	<	33	µg/kg
cis-1,3-Dichloropropene	890202-051	BH002ASO18	2	<	34	µg/kg
cis-1,3-Dichloropropene	890202-050	BH002ASO14	2	<	37	µg/kg
cis-1,3-Dichloropropene	890202-033	BH005ASO08	5	<	35	µg/kg
cis-1,3-Dichloropropene	890202-035	BH005ASO15	5	<	36	µg/kg
cis-1,3-Dichloropropene	890202-034	BH005ASO11	5	<	37	µg/kg
trans-1,3-Dichloropropene	890202-036	BH011ASB00	.	<	5	µg/L
trans-1,3-Dichloropropene	890202-037	BH012ASE00	.	<	5	µg/L
trans-1,3-Dichloropropene	890202-052	BH013ASB00	.	<	5	µg/L
trans-1,3-Dichloropropene	890202-030	BH001ASO10	1	<	29	µg/kg
trans-1,3-Dichloropropene	890202-031	BH001ASO14	1	<	33	µg/kg
trans-1,3-Dichloropropene	890202-032	BH001ASO18	1	<	33	µg/kg
trans-1,3-Dichloropropene	890202-049	BH002ASO10	2	<	33	µg/kg
trans-1,3-Dichloropropene	890202-051	BH002ASO18	2	<	34	µg/kg
trans-1,3-Dichloropropene	890202-050	BH002ASO14	2	<	37	µg/kg
trans-1,3-Dichloropropene	890202-033	BH005ASO08	5	<	35	µg/kg
trans-1,3-Dichloropropene	890202-035	BH005ASO15	5	<	36	µg/kg
trans-1,3-Dichloropropene	890202-034	BH005ASO11	5	<	37	µg/kg
Ethyl benzene	890202-036	BH011ASB00	.	<	5	µg/L
Ethyl benzene	890202-037	BH012ASE00	.	<	5	µg/L
Ethyl benzene	890202-052	BH013ASB00	.	<	5	µg/L
Ethyl benzene	890202-030	BH001ASO10	1	<	29	µg/kg
Ethyl benzene	890202-031	BH001ASO14	1	<	33	µg/kg
Ethyl benzene	890202-032	BH001ASO18	1	<	33	µg/kg
Ethyl benzene	890202-049	BH002ASO10	2	<	33	µg/kg
Ethyl benzene	890202-051	BH002ASO18	2	<	34	µg/kg
Ethyl benzene	890202-050	BH002ASO14	2	<	37	µg/kg
Ethyl benzene	890202-033	BH005ASO08	5	<	35	µg/kg
Ethyl benzene	890202-035	BH005ASO15	5	<	36	µg/kg
Ethyl benzene	890202-034	BH005ASO11	5	<	37	µg/kg
Freon 113	890202-031	BH001ASO14	1		74	µg/kg
Freon 113	890202-030	BH001ASO10	1		400	µg/kg
2-Hexanone	890202-036	BH011ASB00	.	<	10	µg/L
2-Hexanone	890202-037	BH012ASE00	.	<	10	µg/L
2-Hexanone	890202-052	BH013ASB00	.	<	10	µg/L
2-Hexanone	890202-030	BH001ASO10	1	<	57	µg/kg
2-Hexanone	890202-031	BH001ASO14	1	<	65	µg/kg
2-Hexanone	890202-032	BH001ASO18	1	<	66	µg/kg
2-Hexanone	890202-049	BH002ASO10	2	<	67	µg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
2-Hexanone	890202-051	BH002ASO18	2	<	67	µg/kg
2-Hexanone	890202-050	BH002ASO14	2	<	75	µg/kg
2-Hexanone	890202-033	BH005ASO08	5	<	70	µg/kg
2-Hexanone	890202-035	BH005ASO15	5	<	72	µg/kg
2-Hexanone	890202-034	BH005ASO11	5	<	73	µg/kg
Hydrocarbon	890202-031	BH001ASO14	1	PB	34	µg/kg
Hydrocarbon	890202-032	BH001ASO18	1	PB	34	µg/kg
Hydrocarbon	890202-031	BH001ASO14	1	PB	41	µg/kg
Hydrocarbon	890202-051	BH002ASO18	2	PB	31	µg/kg
Hydrocarbon	890202-049	BH002ASO10	2	PB	38	µg/kg
Hydrocarbon	890202-051	BH002ASO18	2	PB	41	µg/kg
Hydrocarbon	890202-035	BH005ASO15	5	PB	31	µg/kg
Hydrocarbon	890202-033	BH005ASO08	5	PB	34	µg/kg
Hydrocarbon	890202-035	BH005ASO15	5	PB	38	µg/kg
Hydrocarbon	890202-034	BH005ASO11	5	PB	42	µg/kg
Hydrocarbon	890202-035	BH005ASO15	5	P	48	µg/kg
Hydrocarbon	890202-035	BH005ASO15	5	P	50	µg/kg
Hydrocarbon	890202-035	BH005ASO15	5	P	63	µg/kg
Iron	890202-030	BH001ASO10	1		23000	µg/g
Iron	890202-032	BH001ASO18	1		37000	µg/g
Iron	890202-031	BH001ASO14	1		58000	µg/g
Iron	890202-051	BH002ASO18	2		24000	µg/g
Iron	890202-050	BH002ASO14	2		28000	µg/g
Iron	890202-049	BH002ASO10	2		45000	µg/g
Iron	890202-033	BH005ASO08	5		41000	µg/g
Iron	890202-035	BH005ASO15	5		43000	µg/g
Iron	890202-034	BH005ASO11	5		55000	µg/g
Lead	890202-032	BH001ASO18	1		8.3	µg/g
Lead	890202-031	BH001ASO14	1		47	µg/g
Lead	890202-030	BH001ASO10	1		51	µg/g
Lead	890202-051	BH002ASO18	2		9.1	µg/g
Lead	890202-050	BH002ASO14	2		22	µg/g
Lead	890202-049	BH002ASO10	2		44	µg/g
Lead	890202-033	BH005ASO08	5		18	µg/g
Lead	890202-035	BH005ASO15	5		26	µg/g
Lead	890202-034	BH005ASO11	5		28	µg/g
Magnesium	890202-032	BH001ASO18	1		2200	µg/g
Magnesium	890202-031	BH001ASO14	1		2300	µg/g
Magnesium	890202-030	BH001ASO10	1		17000	µg/g
Magnesium	890202-049	BH002ASO10	2		1600	µg/g
Magnesium	890202-050	BH002ASO14	2		2500	µg/g
Magnesium	890202-051	BH002ASO18	2		2600	µg/g
Magnesium	890202-035	BH005ASO15	5		990	µg/g
Magnesium	890202-033	BH005ASO08	5		1100	µg/g
Magnesium	890202-034	BH005ASO11	5		1300	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Manganese	890202-030	BH001ASO10	1		1300	µg/g
Manganese	890202-032	BH001ASO18	1		1600	µg/g
Manganese	890202-031	BH001ASO14	1		2100	µg/g
Manganese	890202-051	BH002ASO18	2		260	µg/g
Manganese	890202-049	BH002ASO10	2		1200	µg/g
Manganese	890202-050	BH002ASO14	2		1200	µg/g
Manganese	890202-033	BH005ASO08	5		1500	µg/g
Manganese	890202-034	BH005ASO11	5		3600	µg/g
Manganese	890202-035	BH005ASO15	5		8800	µg/g
Methylene chloride	890202-036	BH011ASB00	.	<	5	µg/L
Methylene chloride	890202-037	BH012ASE00	.	<	5	µg/L
Methylene chloride	890202-052	BH013ASB00	.	<	5	µg/L
Methylene chloride	890202-030	BH001ASO10	1	<	29	µg/kg
Methylene chloride	890202-031	BH001ASO14	1	<	33	µg/kg
Methylene chloride	890202-032	BH001ASO18	1	<	33	µg/kg
Methylene chloride	890202-049	BH002ASO10	2	<	33	µg/kg
Methylene chloride	890202-051	BH002ASO18	2	<	34	µg/kg
Methylene chloride	890202-050	BH002ASO14	2	<	37	µg/kg
Methylene chloride	890202-033	BH005ASO08	5	<	35	µg/kg
Methylene chloride	890202-035	BH005ASO15	5	<	36	µg/kg
Methylene chloride	890202-034	BH005ASO11	5	<	37	µg/kg
4-Methyl-2-pentanone	890202-036	BH011ASB00	.	<	10	µg/L
4-Methyl-2-pentanone	890202-037	BH012ASE00	.	<	10	µg/L
4-Methyl-2-pentanone	890202-052	BH013ASB00	.	<	10	µg/L
4-Methyl-2-pentanone	890202-030	BH001ASO10	1	<	57	µg/kg
4-Methyl-2-pentanone	890202-031	BH001ASO14	1	<	65	µg/kg
4-Methyl-2-pentanone	890202-032	BH001ASO18	1	<	66	µg/kg
4-Methyl-2-pentanone	890202-049	BH002ASO10	2	<	67	µg/kg
4-Methyl-2-pentanone	890202-051	BH002ASO18	2	<	67	µg/kg
4-Methyl-2-pentanone	890202-050	BH002ASO14	2	<	75	µg/kg
4-Methyl-2-pentanone	890202-033	BH005ASO08	5	<	70	µg/kg
4-Methyl-2-pentanone	890202-035	BH005ASO15	5	<	72	µg/kg
4-Methyl-2-pentanone	890202-034	BH005ASO11	5	<	73	µg/kg
Molybdenum	890202-030	BH001ASO10	1	<	1	µg/g
Molybdenum	890202-031	BH001ASO14	1	<	1	µg/g
Molybdenum	890202-032	BH001ASO18	1	<	1	µg/g
Molybdenum	890202-049	BH002ASO10	2	<	1	µg/g
Molybdenum	890202-050	BH002ASO14	2	<	1	µg/g
Molybdenum	890202-051	BH002ASO18	2	<	1	µg/g
Molybdenum	890202-033	BH005ASO08	5	<	1	µg/g
Molybdenum	890202-034	BH005ASO11	5	<	1	µg/g
Molybdenum	890202-035	BH005ASO15	5	<	1	µg/g
Nickel	890202-032	BH001ASO18	1		14	µg/g
Nickel	890202-030	BH001ASO10	1		18	µg/g
Nickel	890202-031	BH001ASO14	1		33	µg/g
Nickel	890202-050	BH002ASO14	2		7	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Nickel	890202-051	BH002ASO18	2		16	µg/g
Nickel	890202-049	BH002ASO10	2		27	µg/g
Nickel	890202-033	BH005ASO08	5		10	µg/g
Nickel	890202-034	BH005ASO11	5		12	µg/g
Nickel	890202-035	BH005ASO15	5		15	µg/g
Potassium	890202-031	BH001ASO14	1		2400	µg/g
Potassium	890202-030	BH001ASO10	1		2900	µg/g
Potassium	890202-032	BH001ASO18	1		3400	µg/g
Potassium	890202-050	BH002ASO14	2		1900	µg/g
Potassium	890202-049	BH002ASO10	2		2000	µg/g
Potassium	890202-051	BH002ASO18	2		3500	µg/g
Potassium	890202-035	BH005ASO15	5		2700	µg/g
Potassium	890202-033	BH005ASO08	5		3000	µg/g
Potassium	890202-034	BH005ASO11	5		3600	µg/g
2-Propanol	890202-051	BH002ASO18	2		530	µg/kg
2-Propanol	890202-050	BH002ASO14	2		17000	µg/kg
2-Propanol	890202-049	BH002ASO10	2		20000	µg/kg
Selenium	890414-085	EP-TOX BLK	.	<	0.005	mg/L
Selenium	890202-037	BH012ASE00	.	<	0.05	mg/L
Selenium	890404-047	BH001ASO14	1	<	0.005	mg/L
Selenium	890404-048	BH001ASO18	1	<	0.005	mg/L
Selenium	890202-030	BH001ASO10	1		16	µg/g
Selenium	890202-032	BH001ASO18	1		33	µg/g
Selenium	890202-031	BH001ASO14	1		58	µg/g
Selenium	890404-052	BH002ASO10	2	<	0.005	mg/L
Selenium	890202-050	BH002ASO14	2		18	µg/g
Selenium	890202-051	BH002ASO18	2		19	µg/g
Selenium	890202-049	BH002ASO10	2		39	µg/g
Selenium	890404-049	BH005ASO08	5	<	0.005	mg/L
Selenium	890404-050	BH005ASO11	5	<	0.005	mg/L
Selenium	890404-051	BH005ASO15	5	<	0.005	mg/L
Selenium	890202-035	BH005ASO15	5		38	µg/g
Selenium	890202-033	BH005ASO08	5		40	µg/g
Selenium	890202-034	BH005ASO11	5		53	µg/g
Silicon	890202-030	BH001ASO10	1		750	µg/g
Silicon	890202-031	BH001ASO14	1		820	µg/g
Silicon	890202-032	BH001ASO18	1		850	µg/g
Silicon	890202-051	BH002ASO18	2		730	µg/g
Silicon	890202-049	BH002ASO10	2		760	µg/g
Silicon	890202-050	BH002ASO14	2		860	µg/g
Silicon	890202-035	BH005ASO15	5		730	µg/g
Silicon	890202-034	BH005ASO11	5		800	µg/g
Silicon	890202-033	BH005ASO08	5		840	µg/g
Silver	890202-030	BH001ASO10	1	<	0.6	µg/g
Silver	890202-031	BH001ASO14	1	<	0.6	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Silver	890202-032	BH001ASO18	1	<	0.6	µg/g
Silver	890202-049	BH002ASO10	2	<	0.6	µg/g
Silver	890202-050	BH002ASO14	2	<	0.6	µg/g
Silver	890202-051	BH002ASO18	2	<	0.6	µg/g
Silver	890202-033	BH005ASO08	5	<	0.6	µg/g
Silver	890202-034	BH005ASO11	5	<	0.6	µg/g
Silver	890202-035	BH005ASO15	5	<	0.6	µg/g
Sodium	890202-031	BH001ASO14	1		50	µg/g
Sodium	890202-032	BH001ASO18	1		61	µg/g
Sodium	890202-030	BH001ASO10	1		68	µg/g
Sodium	890202-049	BH002ASO10	2		34	µg/g
Sodium	890202-050	BH002ASO14	2		34	µg/g
Sodium	890202-051	BH002ASO18	2		50	µg/g
Sodium	890202-033	BH005ASO08	5		100	µg/g
Sodium	890202-035	BH005ASO15	5		100	µg/g
Sodium	890202-034	BH005ASO11	5		110	µg/g
Strontium	890202-032	BH001ASO18	1		2.2	µg/g
Strontium	890202-031	BH001ASO14	1		2.3	µg/g
Strontium	890202-030	BH001ASO10	1		13	µg/g
Strontium	890202-051	BH002ASO18	2		2.2	µg/g
Strontium	890202-049	BH002ASO10	2		3.6	µg/g
Strontium	890202-050	BH002ASO14	2		4.7	µg/g
Strontium	890202-035	BH005ASO15	5		2.9	µg/g
Strontium	890202-033	BH005ASO08	5		3.6	µg/g
Strontium	890202-034	BH005ASO11	5		4.4	µg/g
Styrene	890202-036	BH011ASB00	.	<	5	µg/L
Styrene	890202-037	BH012ASE00	.	<	5	µg/L
Styrene	890202-052	BH013ASB00	.	<	5	µg/L
Styrene	890202-030	BH001ASO10	1	<	29	µg/kg
Styrene	890202-031	BH001ASO14	1	<	33	µg/kg
Styrene	890202-032	BH001ASO18	1	<	33	µg/kg
Styrene	890202-049	BH002ASO10	2	<	33	µg/kg
Styrene	890202-051	BH002ASO18	2	<	34	µg/kg
Styrene	890202-050	BH002ASO14	2	<	37	µg/kg
Styrene	890202-033	BH005ASO08	5	<	35	µg/kg
Styrene	890202-035	BH005ASO15	5	<	36	µg/kg
Styrene	890202-034	BH005ASO11	5	<	37	µg/kg
1,1,2,2-Tetrachloroethane	890202-036	BH011ASB00	.	<	5	µg/L
1,1,2,2-Tetrachloroethane	890202-037	BH012ASE00	.	<	5	µg/L
1,1,2,2-Tetrachloroethane	890202-052	BH013ASB00	.	<	5	µg/L
1,1,2,2-Tetrachloroethane	890202-030	BH001ASO10	1	<	29	µg/kg
1,1,2,2-Tetrachloroethane	890202-031	BH001ASO14	1	<	33	µg/kg
1,1,2,2-Tetrachloroethane	890202-032	BH001ASO18	1	<	33	µg/kg
1,1,2,2-Tetrachloroethane	890202-049	BH002ASO10	2	<	33	µg/kg
1,1,2,2-Tetrachloroethane	890202-051	BH002ASO18	2	<	34	µg/kg
1,1,2,2-Tetrachloroethane	890202-050	BH002ASO14	2	<	37	µg/kg

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Quali-fier[b]	Result	Units
1,1,2,2-Tetrachloroethane	890202-033	BH005ASO08	5	<	35	µg/kg
1,1,2,2-Tetrachloroethane	890202-035	BH005ASO15	5	<	36	µg/kg
1,1,2,2-Tetrachloroethane	890202-034	BH005ASO11	5	<	37	µg/kg
Tetrachloroethene	890202-036	BH011ASB00	.	<	5	µg/L
Tetrachloroethene	890202-037	BH012ASE00	.	<	5	µg/L
Tetrachloroethene	890202-052	BH013ASB00	.	<	5	µg/L
Tetrachloroethene	890202-030	BH001ASO10	1	<	29	µg/kg
Tetrachloroethene	890202-031	BH001ASO14	1	<	33	µg/kg
Tetrachloroethene	890202-032	BH001ASO18	1	<	33	µg/kg
Tetrachloroethene	890202-049	BH002ASO10	2	<	33	µg/kg
Tetrachloroethene	890202-051	BH002ASO18	2	<	34	µg/kg
Tetrachloroethene	890202-050	BH002ASO14	2	<	37	µg/kg
Tetrachloroethene	890202-033	BH005ASO08	5	<	35	µg/kg
Tetrachloroethene	890202-035	BH005ASO15	5	<	36	µg/kg
Tetrachloroethene	890202-034	BH005ASO11	5	<	37	µg/kg
Thorium	890202-030	BH001ASO10	1	<	20	µg/g
Thorium	890202-031	BH001ASO14	1	<	20	µg/g
Thorium	890202-032	BH001ASO18	1	<	20	µg/g
Thorium	890202-049	BH002ASO10	2	<	20	µg/g
Thorium	890202-050	BH002ASO14	2	<	20	µg/g
Thorium	890202-051	BH002ASO18	2	<	20	µg/g
Thorium	890202-033	BH005ASO08	5	<	20	µg/g
Thorium	890202-034	BH005ASO11	5	<	20	µg/g
Thorium	890202-035	BH005ASO15	5	<	20	µg/g
Toluene	890202-036	BH011ASB00	.	<	5	µg/L
Toluene	890202-037	BH012ASE00	.	<	5	µg/L
Toluene	890202-052	BH013ASB00	.	<	5	µg/L
Toluene	890202-030	BH001ASO10	1	<	29	µg/kg
Toluene	890202-031	BH001ASO14	1	<	33	µg/kg
Toluene	890202-032	BH001ASO18	1	<	33	µg/kg
Toluene	890202-049	BH002ASO10	2	<	33	µg/kg
Toluene	890202-051	BH002ASO18	2	<	34	µg/kg
Toluene	890202-050	BH002ASO14	2	<	37	µg/kg
Toluene	890202-033	BH005ASO08	5	<	35	µg/kg
Toluene	890202-035	BH005ASO15	5	<	36	µg/kg
Toluene	890202-034	BH005ASO11	5	<	37	µg/kg
Total solids	890202-032	BH001ASO18	1		75.5	%
Total solids	890202-031	BH001ASO14	1		76.9	%
Total solids	890202-030	BH001ASO10	1		87	%
Total solids	890202-051	BH002ASO18	2		74.2	%
Total solids	890202-049	BH002ASO10	2		74.9	%
Total solids	890202-050	BH002ASO14	2		76.8	%
Total solids	890202-034	BH005ASO11	5		68.3	%
Total solids	890202-035	BH005ASO15	5		69.4	%
Total solids	890202-033	BH005ASO08	5		71.7	%

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Quali-fier[b]	Result	Units
1,1,1-Trichloroethane	890202-036	BH011ASB00	.	<	5	µg/L
1,1,1-Trichloroethane	890202-037	BH012ASE00	.	<	5	µg/L
1,1,1-Trichloroethane	890202-052	BH013ASB00	.	<	5	µg/L
1,1,1-Trichloroethane	890202-030	BH001ASO10	1	<	29	µg/kg
1,1,1-Trichloroethane	890202-031	BH001ASO14	1	<	33	µg/kg
1,1,1-Trichloroethane	890202-032	BH001ASO18	1	<	33	µg/kg
1,1,1-Trichloroethane	890202-049	BH002ASO10	2	<	33	µg/kg
1,1,1-Trichloroethane	890202-051	BH002ASO18	2	<	34	µg/kg
1,1,1-Trichloroethane	890202-050	BH002ASO14	2	<	37	µg/kg
1,1,1-Trichloroethane	890202-033	BH005ASO08	5	<	35	µg/kg
1,1,1-Trichloroethane	890202-035	BH005ASO15	5	<	36	µg/kg
1,1,1-Trichloroethane	890202-034	BH005ASO11	5	<	37	µg/kg
1,1,2-Trichloroethane	890202-036	BH011ASB00	.	<	5	µg/L
1,1,2-Trichloroethane	890202-037	BH012ASE00	.	<	5	µg/L
1,1,2-Trichloroethane	890202-052	BH013ASB00	.	<	5	µg/L
1,1,2-Trichloroethane	890202-030	BH001ASO10	1	<	29	µg/kg
1,1,2-Trichloroethane	890202-031	BH001ASO14	1	<	33	µg/kg
1,1,2-Trichloroethane	890202-032	BH001ASO18	1	<	33	µg/kg
1,1,2-Trichloroethane	890202-049	BH002ASO10	2	<	33	µg/kg
1,1,2-Trichloroethane	890202-051	BH002ASO18	2	<	34	µg/kg
1,1,2-Trichloroethane	890202-050	BH002ASO14	2	<	37	µg/kg
1,1,2-Trichloroethane	890202-033	BH005ASO08	5	<	35	µg/kg
1,1,2-Trichloroethane	890202-035	BH005ASO15	5	<	36	µg/kg
1,1,2-Trichloroethane	890202-034	BH005ASO11	5	<	37	µg/kg
Trichloroethene	890202-036	BH011ASB00	.	<	5	µg/L
Trichloroethene	890202-037	BH012ASE00	.	<	5	µg/L
Trichloroethene	890202-052	BH013ASB00	.	<	5	µg/L
Trichloroethene	890202-030	BH001ASO10	1	<	29	µg/kg
Trichloroethene	890202-031	BH001ASO14	1	<	33	µg/kg
Trichloroethene	890202-032	BH001ASO18	1	<	33	µg/kg
Trichloroethene	890202-049	BH002ASO10	2	<	33	µg/kg
Trichloroethene	890202-051	BH002ASO18	2	<	34	µg/kg
Trichloroethene	890202-050	BH002ASO14	2	<	37	µg/kg
Trichloroethene	890202-033	BH005ASO08	5	<	35	µg/kg
Trichloroethene	890202-035	BH005ASO15	5	<	36	µg/kg
Trichloroethene	890202-034	BH005ASO11	5	<	37	µg/kg
Uranium	890202-037	BH012ASE00	.	<	0.03	mg/L
Uranium	890202-030	BH001ASO10	1	<	3	µg/g
Uranium	890202-031	BH001ASO14	1	<	3	µg/g
Uranium	890202-032	BH001ASO18	1	<	3	µg/g
Uranium	890202-049	BH002ASO10	2	<	3	µg/g
Uranium	890202-050	BH002ASO14	2	<	3	µg/g
Uranium	890202-051	BH002ASO18	2	<	3	µg/g
Uranium	890202-033	BH005ASO08	5	<	3	µg/g
Uranium	890202-034	BH005ASO11	5		4.7	µg/g
Uranium	890202-035	BH005ASO15	5		22	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Vanadium	890202-030	BH001ASO10	1		30	µg/g
Vanadium	890202-032	BH001ASO18	1		31	µg/g
Vanadium	890202-031	BH001ASO14	1		65	µg/g
Vanadium	890202-051	BH002ASO18	2		28	µg/g
Vanadium	890202-050	BH002ASO14	2		33	µg/g
Vanadium	890202-049	BH002ASO10	2		53	µg/g
Vanadium	890202-034	BH005ASO11	5		33	µg/g
Vanadium	890202-035	BH005ASO15	5		33	µg/g
Vanadium	890202-033	BH005ASO08	5		35	µg/g
Vinyl acetate	890202-036	BH011ASB00	.	<	10	µg/L
Vinyl acetate	890202-037	BH012ASE00	.	<	10	µg/L
Vinyl acetate	890202-052	BH013ASB00	.	<	10	µg/L
Vinyl acetate	890202-030	BH001ASO10	1	<	57	µg/kg
Vinyl acetate	890202-031	BH001ASO14	1	<	65	µg/kg
Vinyl acetate	890202-032	BH001ASO18	1	<	66	µg/kg
Vinyl acetate	890202-049	BH002ASO10	2	<	67	µg/kg
Vinyl acetate	890202-051	BH002ASO18	2	<	67	µg/kg
Vinyl acetate	890202-050	BH002ASO14	2	<	75	µg/kg
Vinyl acetate	890202-033	BH005ASO08	5	<	70	µg/kg
Vinyl acetate	890202-035	BH005ASO15	5	<	72	µg/kg
Vinyl acetate	890202-034	BH005ASO11	5	<	73	µg/kg
Vinyl chloride	890202-036	BH011ASB00	.	<	10	µg/L
Vinyl chloride	890202-037	BH012ASE00	.	<	10	µg/L
Vinyl chloride	890202-052	BH013ASB00	.	<	10	µg/L
Vinyl chloride	890202-030	BH001ASO10	1	<	57	µg/kg
Vinyl chloride	890202-031	BH001ASO14	1	<	65	µg/kg
Vinyl chloride	890202-032	BH001ASO18	1	<	66	µg/kg
Vinyl chloride	890202-049	BH002ASO10	2	<	67	µg/kg
Vinyl chloride	890202-051	BH002ASO18	2	<	67	µg/kg
Vinyl chloride	890202-050	BH002ASO14	2	<	75	µg/kg
Vinyl chloride	890202-033	BH005ASO08	5	<	70	µg/kg
Vinyl chloride	890202-035	BH005ASO15	5	<	72	µg/kg
Vinyl chloride	890202-034	BH005ASO11	5	<	73	µg/kg
Xylene (total)	890202-036	BH011ASB00	.	<	5	µg/L
Xylene (total)	890202-037	BH012ASE00	.	<	5	µg/L
Xylene (total)	890202-052	BH013ASB00	.	<	5	µg/L
Xylene (total)	890202-030	BH001ASO10	1	<	29	µg/kg
Xylene (total)	890202-031	BH001ASO14	1	<	33	µg/kg
Xylene (total)	890202-032	BH001ASO18	1	<	33	µg/kg
Xylene (total)	890202-049	BH002ASO10	2	<	33	µg/kg
Xylene (total)	890202-051	BH002ASO18	2	<	34	µg/kg
Xylene (total)	890202-050	BH002ASO14	2	<	37	µg/kg
Xylene (total)	890202-033	BH005ASO08	5	<	35	µg/kg
Xylene (total)	890202-035	BH005ASO15	5	<	36	µg/kg
Xylene (total)	890202-034	BH005ASO11	5	<	37	µg/kg
Zinc	890202-032	BH001ASO18	1		30	µg/g
Zinc	890202-030	BH001ASO10	1		75	µg/g
Zinc	890202-031	BH001ASO14	1		140	µg/g
Zinc	890202-050	BH002ASO14	2		24	µg/g

Table B.1 Soil data for K-1024 Diluting Pit (continued)

Constituent	Sample number	RAP[a] number	Sample location	Qualifier[b]	Result	Units
Zinc	890202-051	BH002ASO18	2		32	µg/g
Zinc	890202-049	BH002ASO10	2		110	µg/g
Zinc	890202-033	BH005ASO08	5		22	µg/g
Zinc	890202-034	BH005ASO11	5		34	µg/g
Zinc	890202-035	BH005ASO15	5		36	µg/g

[a]RAP = Remedial Action Program.

[b]B = Analyte found in associated blank as well as in sample; E = Based on instrument calibration, the reported concentration is considered an estimate; J = The associated numerical value is an estimated quantity; P = Probable identification.

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Susan Flack — ERDMC (K-1024)

Requestor — Document Center (is requested to provide the following document)

Date of request 10/29/96 Expected receipt of document ASAP

Document number ER008491 (K-1024) Date of document Unnumbered Refers to K/ER-13 DO

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ER008491

ENVIRONMENTAL RESTORATION DIVISION DMC

MARTIN MARIETTA ENERGY SYSTEMS, INC.

K-25 Plant | Environmen

Transmittal Title: Remedial Site Evaluation Report on the K-1024 Diluting Pit, Oak Ridge Site, Oak Ridge, Tenn..., K/ER-13&D0	
Transmittal No.: 91-03	Transmittal Date: January 29, 1991

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	J. T. Bradbury	K-1004-A	MS 7428	0	0
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	A. H. Rice	K-303-7	MS 7396	0	0
	W. E. Manrod	K-1550-E	MS 7233	0	0
	R. M. Canon	1000	MS 6342	0	0
	R. W. Glass	K-1580	MS 7599	0	0
	W. T. Thompson	1000	MS 6342	0	0
	D. A. Kucsmas	K-1035	MS 7209	1	1
	L. W. Little	9733-3	MS 8035	0	0
	L. H. Stinton	1000	MS 6342	1	0
	K. S. Jones	K-1035	MS 7209	1	0
DOE	L. Brantley	FOB	RM G126	1	1
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Refer Technical Questions To: P. L. Goddard	Phone: 6-3692
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Originated By: J. L. Haymore, Manager, K-25 Environmental Restoration Program	

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This document has been approved for release to the public by:
[signature] 11/4/96
Technical Information Officer Date
Oak Ridge K-25 Site

agk INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. L. L. Forward
LOCATION

DATE January 28, 1946

ANSWERING LETTER DATE

ATTENTION

COPY TO Dr. A. G. Kammer
Mr. H. F. Priest
File (4)

SUBJECT

As a result of a survey of the concentration of mercury vapor in the air in the Electronic Shop in Building K-1024 made by the Industrial Hygiene group from Laboratory "D", the Safety Department recommends that the following action be taken immediately.

1) That the entire floor of the Electronic Shop, the Machine Shop, Office, Cleaning Room, and Leak Calibration Room be thoroughly vacuum-cleaned and then scrubbed with a solution of six ounces of tri-sodium phosphate per pail of warm water. This scrubbing should be done with bristle brushes, and the persons who handle it should wear neoprene gloves. The floor should then be rinsed with clear water.

2) That these floors, when dry, be sealed with a solution of one gallon of 42° Be sodium silicate to four gallons of warm water. This solution can be either mopped or brushed on. The floor cannot be walked on until it is thoroughly dry. This will take about twelve hours.

3) That all operations involving handling mercury be transferred to the cleaning room where the operation will be performed over the sink. Only a small number of selected individuals should do all the mercury handling.

4) That this group of mercury handlers be provided with suitable funnels, pitchers, catch-pans, etc. that will allow them to handle mercury with a minimum of spillage.

5) That the practice of immediately and thoroughly cleaning up all mercury spills, no matter how small, be instituted at once.

6) That all persons who handle mercury be instructed to wash their hands and faces thoroughly before eating and before leaving the plant at the end of their work period.

7) That the practice of unplugging chemical trap connections by the application of heat be discontinued until a suitable hood can be made available.

Rep. No. 1194

8) That all traps in the floor drains and traps in sinks in which mercury has been handled be cleaned up, and that a schedule be set up for periodic cleaning of these traps.

J H Bull
J. H. Bull
Technical Engineer

Approved: Claude L. Stewart
Claude L. Stewart
Chief Safety Engineer

JHB:hjs

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. L. L. Forward, Superintendent
LOCATION Instrument Division

DATE November 14, 1946

ANSWERING LETTER DATE

ATTENTION

COPY TO Mr. T. E. Lane
Mr. L. G. Damer
Dr. M. J. Costello
Mr. N. H. Ketcham
File (2)

SUBJECT Meeting on Mercury Vapor in K-1024

This letter is to confirm the conclusions reached at a meeting on November 12, 1946, attended by Messrs. L. Leiber and W. T. Allman of the Instrument Division; N. H. Ketcham of the Works Laboratory, Industrial Hygiene Section; Dr. M. J. Costello of the Medical Department; and J. H. Bull of the Safety Department. The purpose of the meeting was to survey progress made in reducing the mercury vapor hazard in Room 13, Electronics Shop, Building K-1024, and to recommend further steps to alleviate this hazard.

The mercury vapor concentration has been gradually reduced during the last nine months to the point where a chronic hazard no longer exists. This improvement is due chiefly to greatly improved housekeeping in the mercury handling operations and to improved general ventilation in this room. In addition, the chemical trap unplugging operation has been modified so that it no longer causes the release of mercury vapor into the room atmosphere.

Continued vigilance with regard to housekeeping should continue to give a low, safe concentration of mercury vapor in this room, and in order to facilitate good housekeeping it was agreed by the group that:

1. A new mercury handling table should be built with a smooth top sloping to a collection well and a ledge around the top with rounded corners so that no crevices will be present to catch mercury. This table should be built with no shelves or drawers below the top and should be slightly larger than the present table.

2. The mercury handling table should be located in a clearly marked-off area and no other equipment, materials, or operations should be located in this area.

3. The floor in the mercury handling area should be painted white and a rounded concrete curb should be built around it. This curb will serve to mark the area off clearly from the rest of the room and will also prevent, to some extent, the spread of spilled mercury beyond its confines.

The method of unplugging chemical traps which is now in use is satisfactory, but it was agreed that in cool weather it would be desirable to have a vent pipe or stack through which the traps could be blown to the outside atmosphere rather than to carry the traps outside or to blow them through an open window, as is the present practice.

It was agreed that the construction of a hood or other means of auxiliary ventilation for the mercury handling or the chemical trap unplugging operation does seem desirable at present, but that the entire situation with regard to ventilation in the Electronic Shop should be referred to Mr. Stam, Industrial Hygiene Engineer, associated with Dr. A. G. Cranch, for his recommendations.

It was agreed also that the Works Laboratory, Industrial Hygiene Section, will continue to make periodic checks of the mercury vapor concentration in the atmosphere of the Electronic Shop.

J H Bull
J. H. Bull
Technical Engineer
Safety Department

JHB:mh

APPROVED: L. L. Daniel
Supervisor
Safety Department

Susan,
Tom thought you
might be able to
use this document
Sylvia

1900
Box 12-5-9-54

...nka Research Associates, Inc., Document Request Form

...completed by subcontractor requesting document)

Jack Buddenbaum / K-25 Site Records
Requestor / Document Center (is requested to provide the following document)

Date of request 3/22/95 Expected receipt of document 4/7/95

Document number none Date of document 10/30/46; 9/24/46

Title and author (if document is unnumbered) Folder w/two reports: Ketcham, N.H.
(1) Summary Report of the Nature of the Chemical Contaminants Found...
(2) Record of Discussion of Paper Entitled "Summary Report of the Nature...
~~Please copy~~ the entire folder

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Signature

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RECORD OF DISCUSSION OF PAPER ENTITLED " SUMMARY REPORT OF THE NATURE OF THE CHEMICAL CONTAMINANTS FOUND IN THE ATMOSPHERE IN THE K-25, K-27, and FERCIEVE AREAS."

Date of Discussion: September 24, 1946

Persons in Attendance: Mr. J. Bull
Dr. M. J. Costello
Dr. A. G. Cranch
Dr. A. G. Kammer
Mr. N. H. Ketcham
Dr. R. H. Lafferty

The different sections of the paper were discussed in the following order:

Section C, Contaminant Mercury
Section D, Contaminant Trichloroethylene
Section E, Contaminant Carbon Tetrachloride
Section G, Contaminant Hydrochloric Acid
Section H, Contaminant Ammonia
Section I, Contaminant Nitrous Fume
Section J, Contaminant Phosgene
Section K, Contaminant Combustibles
Section F, Contaminant Freon 113
Section L, Contaminant Cadmium and Fluorocarbons
Section A, Contaminant Uranium (T)
Section B, Contaminant Fluorine and Hydrofluoric Acid

Section C- Contaminant, Mercury

Building 1024, Room 13— Instrument Repair:

This room is fairly well ventilated in the summer with the doors and windows open. In the winter the ventilation is less adequate.

They repair line recorder tube racks. This involves working with mercury diffusion pumps and traps containing mercury ("chemical traps"). Breakages result in spills of mercury on floor; sometimes hot mercury is spilled. One unplugging operation results in large quantities of mercury and mercury bearing salts being blown into the air. Now it is blow out of windows, previously it was blown out into the room.

There has been great improvement in the housekeeping over the last six months. It is standard practice to have catch basins on the floor under the tube racks to catch possible spills of mercury. Water is kept in the pans under the racks where the mercury is hot. Operators report mercury is sometimes carried into the office on shoes. Mercury spills have occurred throughout the whole room. No mercury could be found on the floor today. There were mercury spills and uncovered containers of mercury on a steel table, with a rim around the top to confine the spilled mercury. A vacuum cleaner is used by the operators on their own areas when spills occur. It has been recommended that the sink in the room not be used for mercury disposal, but the sink contained spilled mercury today. All personnel in the room are probably exposed to mercury.

The M.A.C. is well established at 0.1 mg Hg. per cubic meter. The Polajaef Method is used for analysis. This method is generally accepted as being accurate.

The Safety Department originally recommended that mercury transfer operations and mercury storage be limited to room 14 where a hood was to be provided. This location proved to be very inconvenient and so the recommendation has not been carried out. It would be more convenient to mark off a floor space in room 13 for the mercury transfer table and install a hood there. The hood would pull against the general room exhaust ventilation and might cause the mercury concentration to build up around the benches. It might be adequate to mark off an area for mercury handling, provide adequate handling equipment, keep the area clear to facilitate the clean-up of spills, and depend on general ventilation. If this were done, positive mercury analyses would seldom occur.

"Chemical traps" are being held until a number of them can be unplugged at one time. The procedure used to be to heat them and apply pressure. They are now being washed with hot water before blowing. This operation should be performed under the same hood with the mercury transfer table.

It was agreed to recommend that an area be marked off for mercury storage and handling and that lateral exhaust ventilation be provided. All other equipment and operations to be kept out of this area. The mercury handling table should have a steel top with a flange around it and there should be a floor rim around the area.

The Safety Department suggested the possibility of placing the tube racks under hoods. It was agreed that general room ventilation would be satisfactory for the tube racks if catch pans were used. The major hazard occurs when tubes are resealed.

Examples of analyses of samples taken when mercury diffusion pumps being installed in tube racks:

1- Sample at point where sealing- 30 mgs. Hg/cu. meter (closer to operation than operator would have his face)

2- 0.4 mg. Hg./cu. meter where man normally breathes during this operation.

This is a short operation and is done only 5 to 10 times a week.

Question: Should development of a test for the analysis of urine for mercury be pushed?

Medical Practice:

Operatives are under observation. Should we include everyone in the building?

Operatives come in every 4 weeks. The others should come in twice a year.

Medical Recheck:

An inspection of the gums for gingivitis.

A History to see if he has insomnia, is nervous, or has

Medical Recheck (Continued):

loss of appetite.

Weight Recording.

Blood Pressure recording.

Complete blood count.

Urine analysis for sugar and albumin (mercury content?)

Microspic test.

Neurological examination- for tremors, changes in reflexes, etc.

Acute case of mercury poisoning: Caused by exposure to 40 to 60 mgs. for 8 hour day for 5 days a week, in from one to three months.

Chronic exposure:

Sense of trouble - Tremor (coarse and jerky)

Change of personality (Supervisor can help in this)

Person who was sociable, free and easy, suddenly becomes embarrassed, wants to work alone, gloomy and keeps to himself. Very easily irritated. The change is quite marked.

Urine Test:

Runs in neighborhood of 1 or 2 mgs. per liter.

Samples run about the same.

Urine Test (Continued):

No difference between samples run at end of the day from spot sample in the morning. You get a pretty good line with spot samples at time of examination. There is a certain amount in most anybody working around mercury. All the urines may show some, but it is not definitely correlated with mercury poisoning.

Diagnosis has to be made on some other basis.

Mercury in the urine does not mean mercury poisoning, and it does not always show up in the urine when an individual has mercury poisoning.

Method of Testing:

A colorimetric determination using dibeta napthyl thiocarbozone is being investigated. Dr. Granch will send us information relative to urine mercury analysis.

Medical Notes:

The routine check-up calls for a brief history by the nurse: How is he feeling? Appetite? How does he sleep? Has he lost any time from work since he last appeared? The patient is referred to a doctor for history if something shows up. Blood pressure, complete blood count and urine analysis for sugar and albumin are taken. (Chemical anlysis for mercury?) If nurse finds any symptoms, employee is referred to doctor who makes complete physical examination.

Summary:

Over a period of several months, exposures have been slightly higher than they should have been. There has been some improvement but there is need to go further.

Recommendations:

1- Isolate mercury handling- mark off area where all mercury should be stored. Mercury transfers should be made in marked off area. Lateral ventilator should be installed. There should be rim around the table and rim on the floor to catch spills.

2- Provide hood for chemical traps- unplugging operations. Might be same ventilator set up as for mercury handling.

3- Suggest consultation with Mr. Stam on hood design.

4- Continue method supervising plan of operatives as is.

5- Above medical examination for all employees in building twice a year.

There have been complaints of mercury being carried into office. This has been seen. Watch to see if mercury is tracked. The. are big spills occasionally. Could be caught in fabric of clothes. Should bear down on housekeeping and let shoe covers go. Vapor in the offices should be checked once in a while.

Building 1024, Room 4— Instrument Repair:

About the same ventilation as in Room 13. Fairly good ventilation in summer, fair in winter. Handle some, but less mercury than in Room 13 and never hot. It is easy to control the housekeeping. There is no particular mercury hazard here.

Mercury Recovery- Conditioning Building Laboratory:

Air analysis showed over 0.1 mg. Hg./cu. meter all the time. The operation has been moved out of this laboratory.

Mercury Recovery- 1401 and 1301 Buildings:

Air analyses showed mercury contamination of the atmosphere. Moved out of both locations. The recovery equipment is going to be installed in 1303. The area may need additional ventilation. Area will have cement retaining wall. Operation is to be watched very carefully. Watch aerating operation. Watch vacuum pump exhaust.

Building 1004-C, Room 261 and 265: Instrument Repair:

Analyses as high as 4 and 5 mgs. Hg./cu. meter. Do not know exactly where it is coming from, although some progress made in locating sources. Some spills observed.

Building 1004-C, Room 207

Diffusion pumps on apparatus. No positive analyses. Air conditioned building. Very occasional mercury spills.

Miscellaneous Process Area

Diffusion pumps on Line Recorders break occasionally. Cleaned up promptly.

Summary:

Mercury handling operations in Rooms 261 and 265 of Building 1004-C should be investigated for possible installation of ventilating equipment.

Medical Notes:

Industrial re-checks not now being done. Should be on list. Include mercury recovery operators in set-up.

Section D, Contaminant Trichloroethylene

Divides into three kinds of usage: 1- Degreasing Tank in Bldg. 1401

2- Manual Degreasing

3- With dry ice in Cold Traps.

1- Degreasing Tank in Bldg. 1401

70% of analyses showed 100 p.p.m. or more during a significant portion of the time the analysis was being made.

Estimate of exposure a few of the men experience:

200 p.p.m. during 8 hours a day.

800 p.p.m. for 10 minutes at a time for 15 times a day. (This is too much, particularly if he has tendency to cardiac fibrillation. Trichloroethylene would accentuate this condition.)

The drying operation on large cylinders has been modified. Previously blew trichloroethylene out of cylinder into the room. Now attach a pipe to cylinder and blow vapor out doors. Very satisfactory if done properly.

Approximately same exposure at crane operators level, as on ground. Vapors go to crane level readily.

2- Manual Degreasing

Some areas where manual degreasing done have hoods. Some areas don't have hoods.

Pump Repair Shop- Building 1401

Significant analyses in area around portable degreasing tank. Will continue to check.

Air Conditioning Room, Building 1401

Hood over degreaser no advantage as is, because it vents out into room. Should be attached to exhaust system. Temporary job involving some repair work. Will not continue to use trichloroethylene.

Seal Shop- Building 1401

Does not seem to be significant. Hood used draws very well.

Room 13- Building 1024- Instrument Repair

Do little manual degreasing. Have good hood.

3. With Dry Ice in Cold Traps

Line Recorder Stations in Process Area- Cold Traps

Temperature of mixture is such that vapor pressure is insignificant. Recharge traps about twice a shift, at which time operators are exposed to ~~up to about~~ as much as 500 p.p.m. for short period of time. Girls in stations thought we were checking on them and were filling traps more often than usual while we sampled.

<u>Building 1301- Cold Traps</u>

Might possibly have been significant exposure, but discontinued use of trichloroethylene. Now using C-716. Suggested MAC for C-716 - 1000 p.p.m. Army says might get some irritation from C-716. C-716 is very volatile.

<u>Summary:</u>

Two principle exposures to trichloroethylene:

1- Big degreasing tank in Building 1401.

2- Manual degreasing operations.

No control of issuing of trichloroethylene. Not worthwhile to control.

<u>Method of Analysis:</u>

Using Imperial Halide Gas Leak Detector. Dr. Cranch felt this method is generally acceptable in court. Is accurate in range 100-200 ppm. Not accurate in high concentrations. The new G.E. ultra violet analyzer now on order is to be calibrated for trichloroethylene as well as mercury.

Medical:

Dr. Kammer says he has seen massive exposures to trichloroethylene here involving quite a few men for quite a length of time. Tends to confirm previous impression that trichloroethylene is not very toxic. It does produce narcosis. (Dr. Cranch told of two cases of bad hearts caused by repeated exposure to trichloroethylene. They had abnormal heart conditions to start with and trichloroethylene pushed them over.)

Conclusions:

1- Dr. Cranch stated that trichloroethylene does have effect on cardiac fibrillation. Dr. Kammer says he might have become caloused on the subject but he believes trichloroethylene is relatively harmless, about the same as gasoline vapors but a little more toxic.

2- Tendency to cause dermatitis through defatting. Usually clears up pretty well. Is not dangerous when absorbed through the skin.

3- Man handling trichloroethylene should be checked over thoroughly and more safeguard provided. Check physical conditions closely. Vapor should be used instead of straight stream of trichloroethylene. Straight stream should be eliminated as much as possible or else use it in bottom of tank. Operators could be educated to do this. In cleaning tanks, operators should be provided with air line respirator. Should have a harness and watcher, when cleaning out tanks.

4- It is safe to take down "No Smoking" signs. Considerable work shows smoking in trichloroethylene vapor does not produce significant amount of phosgene.

Medical Control

Nobody with organic heart disease or hypertension should work in area. There is an addiction. (Mr. Stam should come down and advise on ventilating system in exposure areas. The data shows the ventilating system at the 1401 Building degreasing tank has become progressively less effective.)

Never give adrenalin to a person overcome by trichloroethylene. Treat for narcosis- let alone.

Section E- Contaminant Carbon tetrachloride.

To the best of our knowledge carbon tetrachloride is no longer used for manual degreasing jobs. It is not used in any normal operations of the process areas.

Suggested Elimination of issuance: Not to be used except when approved by the Safety Department. Not to be used as a cleaner in the plant.

Section E (Continued)

Limit storage of carbon tetrachloride to laboratory storage stock.

Carbon tetrachloride vapor must be kept below 100 p.p.m.

Section G- Contaminant Hydrochloric Acid.

Building 1101- Acid Bath H-304-B

Characteristic condition is that visible vapor comes off east side of bath.

Usual analysis, 20 to 25 ppm on east side of tank. Have run as high as 110 ppm. Metal containers in area picked up a chloride coating over one weekend.

Building 1401- Acid Bath H-305

Causes no appreciable contamination of area. Due to rebuilding of ventilator on tank.

Crane Operator Level- Acid vapor does not get there in any appreciable quantity. The acid vapor is visible and the men try to stay out of it.

Building 1303

Hydrochloric acid used for recovery and development operations.

Does not appear to constitute a hazard. This area is constantly watched due to the miscellaneous and changing nature of the operations.

Toxicology

Pulmonary edema might result occasionally. There is no all day exposure. Exposure probably 15minutes at a time, a few times a day. There is a very great practical hazard.

Recommendation: Present ventilating system should be repaired.

Medical

There is no particular danger if exposure is below that which will cause pulmonary edema. No chronic effect for lesser exposure.

Section H- Contaminant Ammonia

Building 1303: Ammonia used for recovery and development operations.

Occasionally, analyses have been as high as 350 ppm. Ammonia has adequate warning properties. The area is watched closely.

Hazard: Cylinder of anhydrous ammonia in use. Safety Department should investigate.

Refrigeration Systems:

Do have large amount of ammonia in refrigeration plants. No chronic hazard. Possibility of serious accident if large quantities escaped.

Section I- Contaminant Nitrous Fume

Building 1303:

Use hot nitric acid to clean a large number of nickel plates. Done only occasionally. Hood for job is very effective. If hood should fail danger would be great. Keep track closely. 10 ppm safe. Combination exposure with other things that make it a little more dangerous. If exceed 50 ppm would get into difficulty. American Standard Association has adopted 25. 25 would appear safe. Working on assumption there is no adequate warning. Concentration of brown color is very dangerous.

Watch for spills of nitric acid on wood surfaces. Use sand to clean up, not sawdust.

Building 1004-D, Room 8: Laboratory operations requiring heating nitric acid on hot plates.

Should be watched closely, as hood is known to operate ineffectively. Work order to improve hood has been placed.

Section J- Contaminant, Phosgene

Chlorine type cylinders were received from government arsenals. Found some had not been decontaminated. Routine check made of every cylinder received in plant. 5% showed presence of phosgene. Contaminated cylinder is given a special decontamination treatment before being put through regular cleaning treatment. Take due precaution when phosgene present. Should watch closely.

Section K- Contaminant Combustibles

Davis Vapotester used.

Never have found combustible atmosphere.

Section F- Contaminant Freon 113

312 Section- Pump Repair Shop

Used for manual degreasing. Have occasionally found analyses as high as 500 ppm. Not considered very hazardous. Very low boiling point. Have not found MAC for Freon 113 in available literature.

Section L- Miscellaneous Contaminants

Cadmium:

Sampled in cold Trap Room during Cadmium spray coating of trap.

All personnel had fresh air masks. Recorded high concentration of cadmium. Room isolated from rest of area. Blue green haze remains in the air for hours. We have determined on laboratory basis that silver soldering operations should be checked for cadmium and field work is in progress.

Fluorocarbons: (C-816 and C-716)

No adequate semi-quantitative or quantitative analyses. Is carefully handled because of the cost. Used as coolant in process area. Might become problem at a later date as cost goes down and other uses found for it.

Dust Counting:

A "dust" count survey is in progress in the 1401 building carpenter shop. Doubt if dust is much of a problem except in carpenter shop the air filters are being clogged up with sawdust. No practical problem. No Medical Data.

Section A- Contaminant Uranium

Expected this to be a more serious hazard than it has turned out to be.

Three general groupings of possible sources of air contamination:

1- Normal Operations of the plant.

Building 131- Raw product is fed into plant.

89% of air samples showed no uranium.

The florescent test used is capable of detecting smaller quantities of T than the MAC of 0.15 to 0.2 mg. per cu. meter.

When sizeable leaks occur the personnel are evacuated from the area.

Building 631- Withdrawal of depleted material.

No uranium in 92% of analyses.

Building 306-7- Final product withdrawal.

Will give more thorough coverage in the future.

No valve connections on withdrawal cylinder. Depend on freezing products down with liquid nitrogen. Visible quantities escape into the atmosphere occasionally. Operation performed intermittently.

Building 413- Very little coverage. Same type of operation as buildings 631 and 131.

Building 601- No longer sampled. No significant quantities of uranium were found in the atmosphere.

2- Repair work or special operations involving opening up equipment in process area:

We occasionally find analyses of 0.2 mg. T/cubic meter or greater during short periods of time while this type of operation is performed. Does not represent normal operating conditions. Such exposures are accidental and very infrequent for any one operator.

3- Miscellaneous T Recovery and Development:

Buildings 1301, 1303 and to some extent in Building 1401.

Special operations do result in occasional release of significant quantities of T into the atmosphere. The nature of the operations varies from day to day and from week to week. They are regularly observed in all three areas. One potentially hazardous type of operation involves handling dry T compounds, principally T_3O_8 and ammonium diuranate. T_3O_8 is less hazardous of the two as it is less soluble in the body acids. Ammonium diuranate is soluble in body acids but not water. The visible warning properties of C-616 are considered adequate. Visible hydrolysis product appears in atmosphere containing a normal amount of water vapor. Handling dry dust might result in hazardous quantities getting into air without being noticed.

Medical Notes:

So far as is known, as a result of the work at Rochester, the only damage done by T materials as such is kidney disease. Give full supervision to people who come in. Get complete blood count as indication of general health level. Did do a chemical analysis of urine for T. Even after massive exposure all T is excreted within 2 to 6 hours. No point in doing T analysis for routine measure. When people report exposure as a result of equipment break, we do send urine for T analysis. Occasionally will find in urine. Elimination is rapid.

Section B- Contaminant F_2 and HF

The Alizarin Sulphonate titrations used as a test will detect any fluoride which ionizes in water. Many samples represent mixtures of HF, F_2 or OF_2.

Building 1301

Fluorine is made here by electrolysis. Normally there is no appreciable atmosphere contamination. Occasionally it is necessary to change the electrodes in the cells. This results in high concentrations of HF. The operators wear protective equipment and the work is done in ventilated cells. Does not get into the gneral atmosphere of the building. The F_2 disposal unit has been known to fail to function. In such cases appreciable quantities of different fluorides are emitted from it. In all cases warning properties are very adequate.

Building 1303

Do recovery and development operations which might involve releasing either fluorine or HF into the atmosphere. We have found no significant atmosphere contamination.

Building 1401

About the same kind of work as in building 1303. Ones were using cobalt trifluoride powder. Handled it in such a way that 12.5 mg. per cu. meter was reported. This would be a serious hazard if handled very often. CoF_3 hydrolyzes readily giving HF.

Process Area- Field Conditioning

A series of air analyses around field conditioning crews using F_2. Most analyses showed less than 0.1 ppm. Quantities higher than that were experienced occasionally by the members of the crew. Exposures were for very short periods of time. Experience shows that the average person will detect about 0.1 ppm by odor, hence the warning properties are adequate.

Toxicology of chronic exposure: Bone changes.

#1135

PRINTED IN U. S. A. U. C. & C. 36-A

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Mr. L. L. Forward
LOCATION K-1034 Building

ATTENTION Mr. L. Lieber
COPY TO Dr. M. J. Costello
Mr. L. G. Bamer
Mr. J. C. Worthington (2)
File

DATE January 24, 1947

ANSWERING LETTER DATE

SUBJECT MERCURY IN THE ELECTRONIC SHOP, K-1024.

Accompanying this letter is a copy of a "Report on Visit to Oak Ridge, Tenn., November 25-26, 1946", by Mr. O. G. Stam, industrial hygienist with the Union Carbide Corporation. The sections which have been copied are those which relate to Building K-1024. For room 13 Mr. Stam has in general two recommendations, the first being that the general ventilation and heating arrangement be modified so as to cause as even flow of air from intakes on the north end toward exhaust fans on south end. It seems to us that this recommendation, if carried out, would help to further reduce the mercury vapor hazard in room 13.

Mr. Stam's second recommendation is that lateral exhaust hoods be installed to exhaust mercury vapors arising from operations which are now performed on the mercury handling table and from the chemical trap preliminary cleaning operations. This recommendation furnishes one means of removing an important part of the source of air contamination. Another means of removing the source of contamination would be to conduct these two types of operations in such a way that no mercury vapor is released. In general the problem is one of housekeeping since mercury in closed containers can not release vapor to the atmosphere. On several visits during the last few months the writer has observed that although housekeeping in mercury handling has been greatly improved, droplets of mercury have almost always been in evidence on the mercury handling table, on the floor around the mercury handling table and around the sink in the southwest corner of room 13. Although the mercury vapor concentration in room 13 has been negligible most of the time during the last few months, on at least three occasions, notably December 16, December 2, and November 18, 1946, air analyses have shown as much as two-tenths and four-tenths milligram of mercury per cubic meter. The problem, therefore, has not been solved and we believe that either Mr. Stam's recommendation for hoods covering these operations or else the aids to housekeeping recommended in our letter of November 14, 1946, or perhaps both sets of recommendations, should be adopted.

The question has recently been raised as to whether the employees in room 13 should be permitted to eat their lunch in that room. The Safety Department has recommended that these employees be provided a suitable place to eat their lunch outside of the mercury contaminated area. Reduction or even elimination of a mercury vapor hazard in room 13 would not make eating in this room safe.

Very small amounts of mercury or mercury contaminated dust if taken into the body with food will cause over a period of years exactly the same harmful effects as very small concentration of mercury vapors breathed over the same period. The maximum amount of mercury which can be ingested daily without causing harmful effects is about one-half milligram. Surface contamination in the room which could lead to the ingestion of this amount would be difficult to detect and much more difficult to control.

Another possible solution to the eating problem would be to set apart a section of room 13, possibly the northwest corner, for eating purposes. If this were done rigorous controls on the movement of mercury contaminated equipment and tools into this area would have to be applied and maintained permanently and analytical checks of the table tops would have to be run on a routine basis. In view of the fact that allowing employees to eat in room 13 would introduce a new hazard and one which would be very difficult to control, the Safety Department suggests that continued efforts be made to provide a satisfactory eating place outside of room 13.

No matter where employees eat their lunch one very important precaution which should be vigorously enforced is that employees should wash their hands thoroughly before eating. It is thought that this point should be strongly emphasized and that a program of education and systematic reminders should be instituted.

JHBull

J. H. Bull
Technical Engineer
Safety Department

Reviewed by:

Claude L. Stewart

C. L. Stewart
Asst. Supervisor
Safety Department

JHB:msm

APPROVAL FOR RELEASE

Document: # Unnumbered document Date ;

Title/Subject MISCELLANEOUS CORRESPONDENCE RE MERCURY INFORMATION (1947 - 1970)

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Orvin S. Smith 2/1/93

K-25 Classification & Information Control Officer Date

PARTIAL COPY

REPORT ON VISIT TO OAK RIDGE, TENN, NOV. 25-26, 1946

The Instrument Laboratory 1024.

Room 13:

This room is roughly 75 x 125 feet. It is heated by unit heaters set at ceiling level and blowing air downward on an angle. The net effect is the same as if 8 outboard motors were mounted and run with their propellers in a barrel of water. In other words, a churning of the air. This produces air movement but no air change. This equalizes a recirculation of mercury contaminated air. In the windowed end of this room is a large propeller exhaust fan which is mounted in a window opening. Adjacent to the fan, merely 3 feet away, is an opening window which was open. The air swept in through this window traveling 3 feet and then out through the fan. This merry-go-round effect contributes nothing to general room air ventilation.

There are a few processes which are bound to vaporize mercury and should be done under a hood. Two locations are the sink and the drainage table on the opposite side of the room. Such hoods need not be of the traditional laboratory type, which is none too efficient in air-flow design and is expensive. Since both locations are in front of windows, a simple box hood of metal or masonite enclosing the operating area on sides and top with a good propeller fan set in its back wall will serve the purpose. However, some means of air inlet must be provided for the room if the exhaust fans are to operate efficiently and such incoming air must be heated in cold weather. It is cheaper and more efficient to allow air to enter and be heated at one central location than to draw it in through cracks at high resistance and try to heat it afterward. It is of course axiomatic that whatever amount of air is withdrawn from the room must be replaced by inflow at an equal rate. It is equally important that such make-up air enter at the opposite end of the room from the exhaust points. This provides constant horizontal and unidirectional low velocity air flow to keep the room swept clear of contamination.

A fairly simple method would be to install a bank of the unit heaters in front of an air inlet in the ceiling immediately outside the long wall of room 14. There are so many unit heaters churning the room that removing a few and straightening out the flow would aid greatly. Once such unilateral general air movement is established small momentary operations such as unsoldering need not cause any more worry than if conducted out-of-doors as no buildup accumulation of mercury vapor can occur in a constantly replenished moving air stream. In the summer time the steam can be shut off and it will then aid in removing heat and evaporated moisture.

Room 14, Instrument Laboratory 1024.

This is a long narrow room about 8 x 35 feet with chemical laboratory type exhaust hoods along one long side wall. Acids are handled in the sink trough beneath the hood. The basic idea is standard procedure, but the fact is that the air swoops in at the top of the hood and the acid vapor rolls around in the bottom of the hood and has to move up through the breathing zone level of the operator before being exhausted. That is a little too late to capture and exhaust it. The proper air flow should be in past the operator almost horizontally across the vapor level to the rear wall and then up into the exhaust system. This hood can be greatly improved by cutting a piece of composition board to the full length of the hood and about 24" to 30" wide. This baffle or plate should be suspended from the front upper inside edge of the hood and sloping towards the back wall where it should form a slot opening with the back wall.

The center of exhaust or suction is thus lowered and carried back into the hood to provide front to back air flow with uniform face velocity distribution. In regard to the air requirement to provide make-up air to supplant the air exhausted by this large hood, the air inlet is located in the door to room 13. This places quite a drain on the air of room 13 and will pull up enough negative pressure to hamper propeller exhaust fans in the outside walls of room 13. It will also produce strong cold indrafts in room 13 if a window is opened there.

Room 14, which due to its small dimensions for all practical purposes is an exhaust booth, should have an independent fresh air supply. The air supply inlet with a few unit heaters mounted in it could be set in the upper window and deflect incoming high velocity air towards the ceiling so as not to disturb the hood air flow or annoy the operator. The present emergency exhaust propeller fan in the upper window, could be moved to the lower window where it would be more effective in emergency clearing of injurious vapor from the breathing zone since these vapors are as heavy as air or heavier. A broken acid container on the floor would require a low sweep of ventilation from the open door to the window fan. Most breakage will occur on or stream toward the floor.

The above changes do not involve any great outlay or complicated engineering. Smoke tests confirmed the above need for hood improvement.

O. G. Stem
Industrial Hygienist

December 20, 1946

FAX

COVER SHEET

SHONKA RESEARCH ASSOCIATES, INC.
4939 Lower Roswell Road, Suite 106
Marietta, Georgia 30068
Phone: (404) 509-7606
Fax: (404) 509-7507

TO: Young Moon for Susan Flack

FROM: Tim Bennett

DATE: 6/14/95

NO. OF PAGES:
(excluding cover page) 4

DOCUMENT:

COMMENTS:

Fax Number

06-14-1995 04:50PM FROM ShonkaResearch Assoc. TO 9-1 6155766537 P.02

INTER-COMPANY CORRESPONDENCE

(Insert Name) COMPANY Carbide and Carbon Chemicals Corporation LOCATION Post Office Box P Oak Ridge, Tennessee

TO Mr. B. Speyers
Mr. J. P. Murray
Mr. S. Cromer
Dr. F. W. Hurd
Dr. C. K. Beck

DATE October 13, 1948

SUBJECT Device for the Removal of Mercury Vapor from the Exhaust of Vacuum Cleaner

104.8

Clean up of mercury spills in the Plant Areas in the past was accomplished by using standard type vacuum cleaners. Analysis made of the exhaust stream from cleaners used in this service revealed over tolerance values of mercury vapor.

Tests to determine a suitable filter to minimize such conditions of contamination were initiated. Report No. K-272, "A Device for the Removal of Mercury Vapor from the Exhaust of Vacuum Cleaners" - W. D. Cline and J. A. Westbrook, dated September 20, 1948, summarizes test data and design specifications for the fabrication of a filter for use with the standard tank type vacuum cleaners.

The above report was reviewed by the Central Safety Committee and the use of such filters recommended in connection with the clean up of mercury spills. One filter has been fabricated and is presently being used by the Instrument Department. Results obtained after six (6) hours of intermittent use are highly satisfactory.

It is recommended that vacuum cleaners used for such service in other Plant Areas be equipped with the new filters. Details of filter design are listed in the report, and the necessary filter material may be obtained from Mr. W. D. Cline, Building K-1004-A.

A. P. Dunlap

A. P. Dunlap, Superintendent
Safety and Inspection Division

FLR:AFB:mrh

cc: Mr. R. A. Walker
Mr. R. M. Williams
Mr. R. A. Wiswall
Mr. K. W. Bahler
Mr. G. T. E. Sheldon
Mr. W. D. Cline
Dr. J. S. Lyon
Mr. A. F. Becher
Mr. W. L. Richardson

INDUSTRIAL HYGIENE COMMITTEE

(Formerly Plant Hazards Committee)

Minutes -- Meeting, February 7, 1947

The meeting was opened by the Chairman at 10:00 A. M.

Members present:

Mr. C. N. Rucker, Jr., Chairman	Mr. L. G. Bamer, Secretary
Dr. M. J. Costello	Mr. S. J. Cromer
Mr. A. P. Dunlap	Mr. N. H. Ketcham

Also attending:

Dr. T. W. Nale, Toxicologist, UCCC	Mr. L. L. Forward
Mr. A. P. Huber	Mr. J. H. Bull

The subject of the meeting was Mr. Ketcham's report on his recent trip to the Medical Research Project at Rochester. Mr. Ketcham presented his own report and those present commented as he went along.

The matter of setting up a canister testing program at K-25 was discussed. Mr. Dunlap questioned the legal advisability of testing our own masks. He suggested that we might bring in an Atomic Energy Commission man to observe and to issue reports on mask testing for the Commission. Dr. Nale said that Union Carbide tests its own masks for special chemical exposures and that those results have been completely acceptable so far. Mr. Ketcham suggested that we investigate the possibility of getting Bureau of Mines approval on the U. S. Army Assault Mask for the exposures encountered in this plant. The consensus was that it would be desirable to set up a mask testing program here. Mr. Ketcham said that he felt that the people at Rochester would go along with such a program.

Mr. Ketcham said that a trip to Pittsburgh to discuss the matter with the Bureau of Mines would be desirable and the rest of the Committee agreed that he should go. He warned that such a mask testing program would be time-consuming and would cover a period of months rather than weeks.

Dr. Nale said that he would contact Capt. George Lyon with regard to information on his experience with PG and the Army Assault Mask at Philadelphia. Dr. Costello will request the summary of project medical experience from Capt. Brundage. Mr. Ketcham was asked to write a letter for Mr. Center's signature to Capt. Brundage requesting information on Capt. Lyon's and Capt. B. S. Wolf's experiences with the U. S. Army Assault Mask. Mr. Dunlap suggested that Mr. Ketcham request declassified documents through the Plant Records Department.

Mr. Bamer suggested that consideration be given to the manner in which canisters are stored even before further information on their storage is available. A discussion of the effect of moisture on the canister followed and Mr. Dunlap asked what would happen in case of fire when fog nozzles are used. Mr. Bamer said that in such cases the oxygen breathing apparatus would be recommended.

It was also agreed that the mask testing program should begin by a determination of the performance characteristics of the canister under simple conditions such as continuous exposure to various concentrations of PG and then proceed to work toward answers to the questions proposed by the January 27 meeting of the Plant Hazards Committee. Eventually, all exposed masks brought to the Dispensary should be tested.

Dr. Costello stated that masks are not being used by persons who cut into converter connections and Mr. Rucker said that this should be looked into. Mr. Huber said that a record is being made of the atmospheric conditions each time the process system is cut into. Atmospheric analyses are made by the Cascade Services Department on a minimum schedule of once every two hours on converter change-out jobs.

Mr. Forward suggested that a notation should be made on Hazardous Work Permits as to what exposure conditions have been encountered on the job. Mr. Ketcham said that this information might funnel through his section to regular Safety and Medical channels. Mr. Cromer said it would probably be desirable for the workman on the job to make this statement rather than a foreman who might not actually be present.

Mr. Bamor said that improved education of the workmen in the plant would be helpful in assisting them to understand and to protect themselves against such hazards as the fumes in the converter change-out jobs. He said that the Safety Department will develop such a program of education for the Maintenance Division. Mr. Rucker said that Process Supervision should be present at converter change-out jobs and that he will check into this matter.

Mr. Bamor suggested that the use of carbon tetrachloride be eliminated in cleaning operations and that its use be confined, so far as possible, to fire extinguishers. Dr. Hale discussed a fatality from carbon tetrachloride exposure which occurred recently at South Charleston. Mr. Dunlap warned against the hazard of replacing carbon tetrachloride with inflammable solvents. It was agreed that the Safety Department should make a survey of the use of carbon tetrachloride in the plant and report its findings and recommendations to the Industrial Hygiene Committee.

The next subject discussed was the mercury vapor hazard and Mr. Ketcham reported his observations in the Taylor Instrument Company's Plant in Rochester. Mr. Forward said that the mercury vapor hazard in the Instrument Electronic Shop would be reduced in the coming year by the conversion from glass to metal diffusion pumps. Dr. Hale presented Mr. Stan's ventilation recommendation. Mr. Bull said that the mercury vapor hazard in the Instrument Electronic Shop had been reduced during the past year from a very serious one to a point where it is now almost completely under control and that this has been accomplished by improved housekeeping methods. He said that the Safety Department feels that the carrying out of its recommendations on improved housekeeping facilities at the two points where mercury vapor is released would put the mercury vapor problem completely under control and, thereby, make Mr. Stan's excellent recommendation on room ventilation unnecessary. It was agreed that this seemed the best course in light of the small expense of the changes recommended by the Safety Department and the prospect of a fundamental reduction of the hazard upon changing to metal diffusion pumps.

Dr. Nale said that he did not consider five-minute exposures to three to five milligrams per cubic meter of mercury vapor as presenting any significant hazard if not repeated more often than three or four times a week.

The meeting adjourned at 12:00 noon.

L. G. Bemor
Secretary

L.G.Bemor
JHB:MSM:BE

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Correspondence ~~1024~~

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO Dr. M. J. Costello
LOCATION K-1003

DATE July 7, 1947

ANSWERING LETTER DATE

ATTENTION

COPY TO Mr. L. G. Bamer, K-1005
Dr. F. W. Hurd, K-1004-A
Mr. R. M. Williams, K-1034
File

SUBJECT Mercury Contamination of Room 10, Building K-1024

Dear Dr. Costello:

The air analyses for mercury vapor made in the K-1024 building on June 13, 16, 17, and 25, 1947 and reported in Industrial Hygiene Section reports HA-1108, HA-1109, HA-1114, and HA-1116, respectively, are attached.

Notification of the accident was telephoned to this office by Mr. W. T. Allman, supervisor of the shop, immediately after 8:00 A.M. June 13, 1947. The first analysis was made at 8:25 A.M. at the door-nob hole in the door to room 10. The result of 3.2 mg Hg / cu meter was considered evidence of serious contamination within the room and accordingly Mr. L. G. Bamer, Safety Department Supervisor, was notified immediately by telephone. Subsequent decontamination activities were initiated by the Safety Department.

Starting at 8:35 A.M. a series of air analyses were made in work and office areas adjacent to room 10, establishing that the mercury vapor was being effectively confined in room 10.

At 11:05 A.M. the air being supplied to the decontamination personnel was checked and found free of mercury vapor. Decontamination work proceeded and air analyses in room 10 at 3:00 P.M. and 3:10 P.M. showed effective reduction of the mercury concentration in the atmosphere.

Decontamination and air sampling were continued during the day of June 16, 1947. Air sampling continued June 17, 1947 and showed some residual mercury still present in room 10, but in such small quantity that operation of an exhaust fan brought the concentration below the generally accepted maximum allowable concentration of 0.1 mg Hg / cu meter. A subsequent analysis on June 25, 1947 confirmed that no significant contamination remained.

Dr. M. J. Costello
page 2

The three determinations marked with an asterisk were made by chemical analysis after the method of Polejaeff. All other results were obtained with a General Electric Company Vapor Detector calibrated for mercury.

Very truly yours,

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Section
Works Laboratory

Frank W. Hurd

Frank W. Hurd

NHK:ae

Report No. HA-1108

Date	Time	Sampling Position	Result (Mg. Hg / cu meter)
6-13-47	8:25 A.M.	At a hole in the north door to room #10:	3.2
	8:35 A.M.	At a window midway of room #4 as an electric fan was blowing air from a window in room #10 towards room #4:	0.00
	8:39 A.M.	By open office window in room #4 across from the open window at room #10:	0.00
	8:45 A.M.	At open window in room #9 adjacent to open window at room #10:	0.00
	8:48 A.M.	Face level in hallway outside room #10:	0.12
	9:15 A.M.	Probe was held near a metal cylinder that had been brought out of room 10 near the mercury break:	0.12
	9:20 A.M.	At a hole in the north door to room #10:	1.22
	9:25 A.M.	3 inches above floor, 6 feet from the entrance to room #11 in room #13:	0.14
	9:27 A.M.	Atop work bench in room #13, 6 feet from door to room #11:	0.00
	11:05 A.M.	In hallway 16 feet from room #10 at intake to combination hose mask pump which was supplying air to decontamination workers in room 10:	0.00
	3:00 P.M.	Face level, south end of room #10:	0.12
	3:05 P.M.	Face level, room 11:	0.00
	3:10 P.M.	Face level, north end of room #10:	0.4

Report No. HA-1109

Date	Time	Sampling Position	Result (Mg. Hg / cu meter)
6-16-47	8:30 A.M.	Face level, north end of room #10:	0.10
		At the floor level in the same position:	0.14
	8:45 A.M.	Face level, center of room #11:	0.00
		At the floor level:	0.02
	9:00 A.M.	Face level, room #10:	0.11
		Floor level, room #10:	1.21

Report No. HA-1109 (cont'd)

Date	Time	Sampling Position	Result (Mg. Hg / cu meter)
6-16-47	9:20 A.M.	Room 10: Inside the oven while it was on:	1.21
		Room 10: 6 feet from the closed oven door:	0.21
		Room 10: At the floor near the oven:	1.21
	9:30 A.M.	Center of room #10:	0.11
	3:00 P.M.	Face level, north end of room #10:	0.05
		Face level, south end of room #10:	0.04
		At floor level, south end of room #10:	1.21
	3:15 P.M.	Face level, south end of room #10:	0.00
		Face level, in hall outside room #10:	0.00

Report No. HA-1114

Date	Time	Sampling Position	Result (Mg. Hg / cu meter)
6-17-47	9:01 A.M.	Face level, north end of room #10:	0.4 *
		Face level, north end of room #10:	0.21
		(Exhaust fan in room #10 turned on at 9:08 A.M.)	
	9:14 A.M.	Face level, north end of room #10:	<0.1 *
		Face level, north end of room #10:	0.05
	9:26 A.M.	Face level, center of room #11:	0.1 *
		Face level, center of room #11:	0.10
	9:30 A.M.	Face level, center of room #11:	0.00

Report No. HA-1116

Date	Time	Sampling Position	Result (Mg. Hg / cu meter)
6-25-47		Face level, aisle #2, room #13:	0.00
		Face level, aisle #3, room #13:	0.00
		Face level, room #10:	0.00

N. H. Ketcham

N. H. Ketcham
Industrial Hygiene Section
Works Laboratory

PRINTED IN U.S.A. U.C.& C. 36-A

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

TO M. J. Costello, M.D. (2)
LOCATION K-1003

DATE October 23, 1947 104.8

ANSWERING LETTER DATE October 17, 1947

ATTENTION
COPY TO N. H. Ketcham
File

SUBJECT Air Analyses for Mercury, Building K-1024

As requested, copies of Service Report HA-1108, showing the results of air analyses following a mercury spill in Building K-1024 during the preceding night or early morning of June 13, 1947, are attached.

Frank Hurd
Frank W. Hurd

FWH:NHK:ae

Copies forwarded to Insurance Dept. 10/27
L.

WCX-163

THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

Done for a while

TO M.J.Costello,M.D.
LOCATION Dispensary
ATTENTION Dr.Costello
COPY TO file

Hold for Dr Costello

DATE 6-27-47
ANSWERING LETTER DATE
SUBJECT PRICE,William Link
Medical No.23515
Accident: 6-13-47
Reported: 6-19-47

Dear Dr.Costello:

In connection with the above captioned matter,will you kindly supply us with copies of the analysis report showing the readings for mercury, room 10 Bldg.1027. 1024

Thanking you for your kind cooperation,I am,

Very truly yours,

C.O.Burns
Insurance and Compensation Dept.

R.H. Ketcham
Ind. Hygiene Sect.
K1024D

COB/dV

THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

INTER-COMPANY CORRESPONDENCE

COMPANY CARBIDE AND CARBON CHEMICALS CORP. LOCATION Post Office Box P OAK RIDGE, TENN.

Mr. N. H. Ketcham
Industrial Hygiene Section
K-1004-D

Dr. Costello
file

October 17, 1947
DATE 6-27-47

ANSWERING LETTER DATE

SUBJECT Mercury Analysis
PRICE, William Link
Medical No. 23515
Accident: 6-13-47
Reported: 6-19-47

1024

Dear Mr. Ketcham:

With regard to alleged spill of mercury on June 13, 1947, A. E. C. has requested copies of analysis report, showing the readings for mercury in building 1027, room 10.

Will you kindly supply this office with the above readings. Your prompt attention to this matter will be greatly appreciated.

~~... kindly supply us with copies of the analysis report showing the readings for mercury, room 10 Bldg. 1027.~~

Yours very truly,

~~Thanking you for your kind cooperation, I am,~~

M. J. Costello, M. D.
Director, Medical Dept.

~~Very truly yours~~

~~C. O. Burns~~
~~Insurance and Compensation Dept.~~

MJC/mkp

~~COB/SV~~

Rep. No. 1868

K/EM-141

REPORT OF
INDUSTRIAL HYGIENE FIELD INVESTIGATIONS
DURING THE FIRST AND SECOND QUARTERS 1948

(Sanitized Version of K-247, Parts 1 and 2, dated August 9, 1948)

Compiled by
S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

May 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7101
managed by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

CONFIDENTIAL - RD.

Approved for issue by [signature] Report Number: ~~K-247, Parts 1 and 2~~

Date of issue: August 9, 1948

AEC RESEARCH AND DEVELOPMENT REPORT

CARBIDE AND CARBON CHEMICALS CORPORATION
MEDICAL DEPARTMENT
K-25 PLANT

Remains CRD, 4/26/94
~~Sam W. Wohlfort (ADD)~~

REPORT OF INDUSTRIAL HYGIENE FIELD INVESTIGATIONS DURING THE FIRST AND SECOND QUARTERS, 1948 (U)

Compiled by N. H. Ketcham

CONFIDENTIAL - RD

CLASSIFICATION CHANGED TO
By authority of W L Harwell on 3/18/54

By A J Gibbs Date 8/17/56

File No. 7

PRD-1-NS

Classification (level and category): REMAINS CRD
ADC or ADD signature (first reviewer): Sam W. Wohlfort 5/11/95 Date
ADD signature (final reviewer): Nat Reynolds Date

Distribution:

Mr. C. E. Center
Mr. A. P. Huber
Mr. W. B. Humes
A. G. Kammer, M. D.

Chief, Clinton Production Division (3)
Attn: Mr. J. C. Robinson

Electrical Maintenance Division
Attn: Mr. H. R. House

Engineering Development Division
Attn: Mr. S, Cromer

Industrial Relations Division (4)
Attn: Mr. R. R. Wolf
Mr. C. O. Burns
M. J. Costello, M. D. (2)

K-25 Laboratory Division Central File
(Mr. S. D. Schiffman) (3)
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Manufacturing Office
Attn: Mr. J. A. Elkins

Planning Department
Attn: Mr. H. L. Barnett

Plant Engineering Division
Attn: Mr. R. M. Batch

Plant Protection Division
Attn: Mr. J. J. McCarthy

Plant Records Department (2)
Attn: Mr. G. E. Randall

Power Division
Attn: Mr. D. H. Riley, Jr.

Process Division Central File
(Mr. G. E. Stubbs) (5)
Mr. H. W. Carnes
Mr. J. A. Marshall
Mr. J. P. Murray
Mr. G. T. E. Sheldon

Safety and Inspection Division (2)
Attn: Mr. A. P. Dunlap

CONFIDENTIAL-RD

DOE AA
8/2/94

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Report number: K-247, Parts 1 and 2

Date of issue: August 9, 1948

Title: Report of Industrial Hygiene Field Investigations During the First and Second Quarters, 1948.

INTRODUCTION

The results of industrial hygiene investigations during the first and second quarters of the year 1948 are summarized. The data includes the results of air analyses for possible chemical contaminants in the atmosphere, and measurements of other factors of potential influence on the health of the personnel, such as noise or heat. Sufficient explanatory comment is included to assist the reader in evaluating the data in terms of the effectiveness of plant health protection activities.

In cases where investigations revealed a condition such that impairment of the health of the workers might result, the findings were specifically discussed with the division or department supervisor.

In many cases, the data reported herein is supplemented by more specific measurements of actual exposure, such as reported quarterly in the Medical Department "Report of Special Chemical and Physical Urine Analyses," plant report number K-186, part 1, First Quarter, 1948; and part 2, Second Quarter, 1948.

The investigations, with the exception of the noise level and sound frequency measurements, were conducted in the field by the personnel of the Industrial Hygiene Group of the K-25 Works Laboratory. The necessary analyses were also performed largely by that group, with the assistance, in certain cases, of other staffs in the K-25 Laboratory Division. The required development of methods of sampling and analysis was also done by the K-25 Laboratory Division. Total noise level and component sound frequency measurements were performed by the K-25 Instrument Engineering Department. The Medical Department gratefully acknowledges the assistance of these staffs in carrying out the above activities contributing to the program of the medical supervision of the plant employees.

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SUMMARY OF INDUSTRIAL HYGIENE SERVICES AVAILABLE

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Dark field counting
X-ray diffraction identification
Gravimetric determination of atmospheric dust content
Particle size distribution (modified Cascade Impactor)

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Wet bulb-dry bulb temperatures
Radiant heat

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Total noise level (measured in decibels)
Component sound frequency analysis

Air Analyses for Specific Abnormal Constituents

Ammonia
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Cadmium fume or dust
Carbon Monoxide (MSA Indicator)
Carbon tetrachloride
Fluorine
Fluoride dusts or smokes
Hydrogen chloride
Hydrogen fluoride
Hydrogen sulfide (MSA Detector)
Mercury vapor and dust (GE Vapor Detector, chemical analysis, and selenium sulfide detector)
Nickel dust
Nitrite nitrogen (nitrous fumes)
Phosgene (CWS detector)
Total organic vapor (activated carbon collection)
Trichloroethylene
Trifluorochloroethylene
Uranium (dust or vapor)

SUMMARY OF LOCATIONS IN WHICH INVESTIGATIONS WERE MADE DURING THE FIRST AND SECOND QUARTERS, 1948

Note: The following list does not include the locations which currently only require periodic observation. Many locations not listed below have been investigated during the four year period of the existence of the industrial hygiene program, but at present are merely observed periodically or reinvestigated following operational changes which might influence the health aspects of the working environment.

Building	Room or Area	Investigation	Number of Air Samples Taken
K-25	K-303-3, Cell #1	Heat	One investigation of wet-dry bulb temperatures, linear air flow, sound volume, and sound frequency analyses.
K-25	K-303-3, Cell #1	Sound	
K-25	K-302-5, Cell #1	Heat	
K-25	K-302-5, Cell #1	Sound	
K-27	K-402-6, Cell #5	Heat	
K-27	K-402-6, Cell #5	Sound	
K-413	Polymerization area	Trichloroethylene	4
K-413	Polymerization area	Total organic vapor	26
K-413	Polymerization area	Total fluorocarbons (as CF_2:CFCl)	2
K-1004-A	Room 18	Mercury	6
K-1004-A	Room 20	Uranium	1
K-1004-A	Room 22	Mercury	13
K-1004-A	Room 22	Nitrous fumes	1
K-1004-A	Room 22	Total acids (HCl and HNO_3)	1
K-1004-A	Room 23	Mercury	3
K-1004-A	Room 59	Mercury	3
K-1004-A	Room 63	Mercury	4
K-1004-A	Room 68	Mercury	1
K-1004-C	Room 207	Mercury	8
K-1004-C	Room 214	Mercury	3
K-1004-C	Room 215	Mercury	10
K-1004-C	Room 219	Mercury	3
K-1004-C	Room 220	Mercury	3
K-1004-D	Room 005	Mercury	3
K-1004-D	Room 04	Mercury	2
K-1004-D	Room 05	Mercury	3
K-1004-D	Room 05	Total acids	2
K-1004-D	Room 05	Hydrogen fluoride (and fluoride dusts)	5
K-1004-D	Room 05	Uranium	4
K-1004-D	Room 05	Trichloroethylene	19
K-1004-D	Room 05	Phosgene	7
K-1004-D	Room 07	Beryllium	1
K-1004-D	Room 08	Mercury	3
K-1004-D	Room 09	Mercury	2

Building	Room or Area	Investigation	Number of Air Samples Taken
K-1004-D	Room 3	Mercury	11
K-1004-D	Room 4	Mercury	10
K-1004-D	Room 8	Nitrous fumes	1
K-1004-D	Room 8	Mercury	10
K-1004-D	Room 11	Trichloroethylene	2
K-1004-D	Room 11	Mercury	9
K-1004-D	Room 12	Mercury	6
K-1004-D	Room 17	Hydrogen fluoride	2
K-1004-D	Room 17	Mercury	4
K-1004-D	Room 17	Hydrogen sulfide	1
K-1004-D	Room 19	Mercury	3
K-1004-D	Room 19	Hydrogen fluoride	2
K-1004-D	Room 20	Mercury	2
K-1004-D	Room 21	Uranium	1
K-1004-D	Room 21	Mercury	3
K-1004-D	Room 22	Mercury	3
K-1004-D	Stockroom	Mercury	4
K-1024	Room 4	Mercury	9
K-1024	Room 7	Mercury	6
K-1024	Room 10	Mercury	8
K-1024	Room 13	Mercury	19
K-1024	Room 14	Mercury	6
K-1024	Room 22	Mercury	1
K-1024	Utility closet	Mercury	4
K-1030	Cleaning room	Carbon tetrachloride	10
K-1035	Laboratory storage area	Mercury	3
K-1037	Testing laboratory	Mercury	63
K-1037	Manufacturing area	Nickel	30
K-1049	Garage area	Carbon monoxide	8
K-1050	Garage area	Carbon monoxide	8
K-1050	Paint shop	Enamel spraying	3
K-1095	Room 1	Mercury	2
K-1095	Room 2	Mercury	2
K-1095	Room 3	Mercury	2
K-1095	Room 5	Mercury	10
K-1095	Supply room	Mercury	1
K-1301	Conversion room	Fluorine	2
K-1301	Cubicle #3	Fluorine	1
K-1301	Grinding room	Uranium	4
K-1302, cells #1,2,3,& 4	Storage tanks (inspection)	Fluorine (also HF)	10
K-1303	Decontamination room	Nitrous fumes	14
K-1303	Decontamination room	Mercury (stills)	18
K-1303	Cubicle #5	Ammonia	1
K-1401	Cleaning area (converter welding)	Cadmium fume	2
K-1401	Cleaning area (converter welding)	Uranium	4
K-1401	Cleaning area (converter welding)	Hydrogen fluoride	2
K-1401	Cleaning area (converter welding)	Nickel	2

Building	Room or Area	Investigation	Number of Air Samples Taken
K-1401	Cleaning area (degreaser)	Trichloroethylene	104
K-1401	Cleaning area (CWS cylinders)	Trichloroethylene	18
K-1401	Cleaning area (CWS cylinders)	Phosgene	2
K-1401	Pump shop (degreaser)	Trichloroethylene	10
K-1401	Carpenter Shop	Dust (wood and Transite)	8
K-1401	Storeroom, furnace area	Mercury	2
K-1401	Works Laboratory, room 22	Mercury	1
K-1401	Research Laboratory, room 204	Mercury	20
K-1401	Research Laboratory, room 210	Mercury	36
K-1401	Research Laboratory, room 215 B	Dust (silica)	4
K-1401	Research Laboratory, room 215 N	Mercury	35
K-1401	Research Laboratory, room 252	Mercury	31
K-1401	Research Laboratory, room 254	Mercury	1
K-1401	Barrier shop.	Uranium	2
K-1401	Barrier shop	Nickel	2
Manhole	North of K-1004-C	Combustibles	1
Manhole	North of K-1004-C	Oxygen deficiency	1

Air Analyses for Nickel

Three areas were investigated to determine the extent of air contamination resulting from operations involving small particle size nickel dust, or in one case, possible nickel oxide fume. Nickel metal per se is generally considered to be among the less toxic metals. (Nickel carbonyl is known to be quite toxic.) No maximum allowable concentrations have been established for nickel. For the purposes of this report concentrations equaling or exceeding 0.5 mg. Ni/m^3 are considered of possible significance if prolonged exposures were to be undergone.

The results of air analyses for nickel are summarized below:

Location	Number of Analyses	Number of Analyses above 0.5 mg. Ni/m^3
K-1037	30	2*
K-1401, cleaning area (converter welding)	2	0
K-1401, Barrier Shop	2	0

* Dust respirators are used by the personnel.

Air Analyses for Mercury

Of the 49 areas in which a total of 415 air analyses were made for mercury vapor, nine analyses representing seven areas were above the maximum allowable concentration of 0.1 mg. Hg/m^3. The following summary of the analyses above 0.1 mg. Hg/m^3 confirms the conclusion reached on the basis of urinary mercury analyses (Medical Department Report K-186, parts 1 and 2) that some random mercury vapor exposure does still occur, but that chronic exposure to possibly harmful levels has been eliminated.

Location	Total Number of Samples	Number of Analyses above 0.1 mg. Hg./m³	Comment
K-1004-A, Rm. 22	13	1	Known mercury spill
K-1004-C, Rm. 215	10	1	Known mercury spill
K-1004-C, Rm. 207	8	1	Known mercury spill
K-1004-D, Rm. 12	6	1	Known mercury spill
K-1037, Testing Lab	63	2	Known mercury spills
K-1095 (Old F-05)	17	2	Residual contamination from Fercleve operation. Cleaned up, and subsequent analyses showed contamination effectively removed.
K-1303 (Hg. Stills)	18	1	(Analysis was 0.10 mg. Hg./m³).

Air Analyses for Trichloroethylene

Of the six areas in which a total of 157 air analyses were made for trichloroethylene vapor, twenty-three analyses representing five areas were somewhat above the maximum allowable concentration of 200 ppm. Due to the intermittant nature and short duration of the personnel exposures to these concentrations, they are not considered injurious. This conclusion is strengthened by the lack of evidence of personnel injury as determined from the medical examinations of the men concerned.

The analyses over 200 ppm were obtained in the following locations:

Location	Total Number of Analyses Made	Number of Analyses above 200 ppm	Comment
K-413	4	3	(TCE transfer, not normal operation)
K-1004-D, Rm. 05	19	3	(TCE distillation, not normal operation)
K-1004-D, Rm. 11	2	2	
K-1401, Cleaning Area Degreaser	104	12	
K-1401, Pump Shop Degreaser	10	3	

Air Analyses for Carbon Tetrachloride

The use of carbon tetrachloride for general manual degreasing or cleaning purposes has been discouraged, with less toxic substitutes such as trichloroethylene

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Document: # K-178/PTXII; Date 1/15/49;

Title/Subject HEALTH PHYSICS ACTIVITIES FOR DECEMBER 1948 -- S. Visner and C.L.Gritzner

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Document: # K-178/PTV/DEL; Date 6/25/48;

Title/Subject HEALTH PHYSICS ACTIVITIES FOR MAY 1948 -- S. Visner

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K-25 Classification & Information Control Officer Date

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Document: # K-86/PT3; Date 1/20/48;

Title/Subject REPORT OF HEALTH PHYSICS ACTIVITIES FOR DECEMBER 1947 -- S Visner

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Document: # K-86/PT1; Date 11/14/47;

Title/Subject REPORT OF HEALTH PHYSICS ACTIVITIES AT THE K-25 PLANT FOR OCTOBER 1947 -- S Visner

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TABLE I

INDUSTRIAL HYGIENE AIR SAMPLING

DECEMBER, 1947

Air Samples for Uranium Analyses

Total number of samples	13
Number of samples containing 0.00 mg.U/cubic meter	11
Number of samples containing greater than 0.15 mg. U/cubic meter	2*

* Both of these samples were taken in room 21, Building K-1004-D approximately 30 minutes after a UF_6 leak had occurred on December 30, 1947.

Air Samples for Mercury Analyses

Total number of samples	59
Number of samples containing less than 0.1 mg. Hg./ cubic meter	49
Number of samples containing 0.1 mg. Hg/ cubic meter, or greater	10*

* Five of these samples were taken on December 2, 1947 in room 63, K-1004-A. A mercury spill had occurred the preceding day. Clean up efforts were being made. One of these analyses represented atmosphere in a mercury storage area, room 72, K-1004-A. Four were obtained in room 215N, K-1401.

Air Samples for Trichlorethylene Analyses

Total number of samples	30
Number of samples containing less than 200 ppm	24
Number of samples containing 200 ppm or greater	6*

* These analyses were obtained at working positions around the K-1401 Building Cleaning Area degreasing tank and Pump Shop degreaser. Exposure time of any one man is limited and intermittent, hence the data is not considered indicative of any significant exposure.

Air Samples for Dust Counts

Total number of samples	6
Number of samples containing less than 5 MPPCF	5
Number of samples containing greater than 5 MPPCF	1*

* For experimental purposes, this sample was taken in the K-1069 Sand Blasting Shop, immediately following a blasting operation. Protective equipment is worn by personnel doing sand blasting.

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Six air analyses for mercury, not included in the above tabulation, were made to study the mercury vapor concentrations in the exhausts of vacuum cleaners used to clean up mercury spills. A mercury analysis on the dust scraped from one of these vacuum cleaners was also performed. This information is being assembled by the Safety and Inspection Division.

A water-soluble fluoride analysis made on a leak detector probe confirmed a preliminary diagnosis of a hydrogen fluoride burn.

The following analyses were made at the site of the F-01 Building at the request of the Atomic Energy Commission. The results are not included in the above data tabulation.

Air samples for fluoride analyses	8
Air samples for uranium analyses	8
Cement samples for uranium analyses	8
Cement samples for alpha activity	8
Wipe tests for fluoride	8
Wipe tests for uranium	8

AIR ANALYSES FOR CHEMICAL CONTAMINANTS

May 1948

Location	Contaminant	Maximum Allowable Concentration	Sampling Schedule	Number of Samples	Average Concentration	Number over Tolerance	Remarks
K-1024, West Wing	Mercury	0.1 mg/cu m	Monthly	6	0.01 mg/ cu m	None	Janitor's closet in front hall of K-1024 discontinued at request of R.M.Williams
K-1024, East Wing	Mercury	0.1 mg/ cu m	Monthly	4	0	None	
K-1037, Barrier Test Room	Mercury	0.1 mg/ cu m	Weekly	6	0	None	
K-1004-D, Room 3	Mercury	0.1 mg/ cu m	Monthly	3	0	None	
K-1004-D, Room 4	Mercury	0.1 mg/ cu m	Monthly	2	0	None	
K-1004-D, Room 005	Mercury	0.1 mg/ cu m	Special	3	0	None	Raman spectrograph machine in operation.
K-1030, Cleaning Rm.	Carbon Tetra-chloride	100 ppm	Monthly	4	100 ppm approximate	1	300-400 ppm carbon tet around equipment taken from degreaser. Rapidly dissipated
K-1401, Cleaning Area, Degreasor	Trichlor-ethylene	200 ppm	Monthly	6	100 ppm approximate	2	These two reported as "300 - 500 ppm occasional"
K-1401, Vacuum Pump Shop, Degreaser	Trichlor-ethylene	200 ppm	Monthly	2	100 ppm approximate	None	

Box # 12-2-5-27

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Susan Flack / K-25 Site Records
Requestor — Document Center (is requested to provide the following document)

Date of request 3/22/95 Expected receipt of document 4/7/95

Document number ______ Date of document ______

Title and author (if document is unnumbered)
K-1024 Air Analyses 1961-1962 Hg, NO_2, isopropanol, PCE,
K-1037 F_2, Cd, Zn, CO
Please copy the entire folder

(This section to be completed by Document Center)

Date request received 3/27/95

Date submitted to ADC 4/3/95

Date submitted to HSA Coordinator 3/27/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 4/3/95 6/5/95

Date received from CICO 5/9/95 7/10/95

Date submitted to ChemRisk/Shonka and DOE 7/11/95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received ______

Signature ______

Compiled by

S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

July 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7301
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

Sanitized Version of

FOLDER ENTITLED K-1024 AIR ANALYSES 1961-62

2

INDUSTRIAL HYGIENE ~~FIELD~~ Chris SAMPLING REPORT

DATE OF SERVICE TRIP 10-11-'62 BUILDING K-1024 ROUTINE ☑ REPORT NO. I.H. #4

SPECIAL ☐ REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
	Acid Room-	0900			Mercury			
	Face Level					2.	0.02	This area will
	Floor under work Table					46	0.50	be cleaned-
	Work Table					2	0.02	
	Top of Storage Bins					32	0.33	
	Inside Hood - Face level					1	0.01	
	Leak Tester Repair							
	Face Level					0	0.00	
	Floor.					0	0.00	
	Transmitter Repair Room-							
	Face Level					0	0.00	
	Floor-					1.	0.01	
	Line Recorder Repair							
	Face Level					0	0.00	
	Floor-					0.	0.00	
	Glass Repair Room-							
	Face Level-					0	0.00	
	Work Table					1	0.01	
	Floor-					2	0.02	
Hg-	Vacuum Cleaner #229102							not operating
	Face Level					0	0.00	
	1 Ft. from Exhaust					0	0.00	
	Exhaust					0	0.00	
	Face level					0	0.00	operating
	1 Ft. from Exhaust					0	0.00	
Hg-12-	6 hrs. Exhaust					1	0.01	

Misc. - 6.

SAMPLED BY Eastridge + Bomar -1300 SUPERVISOR W. W. Smith DATE RELEASED 10-31-62

WEM

INDUSTRIAL HYGIENE FIELD SAMPLING REPORT

DATE OF SERVICE TRIP 12/13/62

BUILDING K-1037

ROUTINE ☑

SPECIAL ☐

REPORT NO. 914

REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
	Cleaner Room							
1	EAST side of Cleaner No. 3	1315- -1345	3	90	Dust		0.2 MPPCF	
2	" " "	1345- -1415	3	90	Dust		0.3 MPPCF	
3	" " "	1415- -1445	3	90	Dust		0.1 MPPCF	
4	" " "	1445- -1515	3	90	Dust		0.2 MPPCF	
5	West Side of Cleaner No. 3	1315- -1345	3	90	Dust		0.4 MPPCF	
[illegible]	" " "	1345- -1415	3	90	Dust		0.2 MPPCF	
7	" " "	1415- -1445	3	90	Dust		0.1 MPPCF	
8	" " "	1445- -1515	3	90	Dust		0.3 MPPCF	

SAMPLED BY D. Trivett 1/13/63

SUPERVISOR W. [illegible]

DATE RELEASED 1/18/63

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WE7N

INDUSTRIAL HYGIENE FIELD SAMPLING REPORT

DATE OF SERVICE TRIP 12/13/62 BUILDING K-1037 ROUTINE [✓] SPECIAL [ ] REPORT NO. 915 REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
1	middle of Blender Room	1315-1345	1	30				
2	" " "	1345-1415	1	30				
3	" " "	1415-1445	1	30				
4	" " "	1445-1515	1	30				
5	By Drum Dumper	1315-1345	1	30				
6	" " "	1345-1415	1	30				
7	" " "	1415-1445	1	30				
8	" " "	1445-1515	1	30				

...and Health Physics

SAMPLED BY J. K. Lowery TK 1/3/63 SUPERVISOR DATE RELEASED

4

INDUSTRIAL HYGIENE FIELD SAMPLING REPORT

DATE OF SERVICE TRIP 12/13/62 BUILDING K-1037 ROUTINE [✓] SPECIAL [ ] REPORT NO. 916

REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
	North Manufacturing Room							By operator of machine.
1		1320- -1350	1	30				
2		1350- -1420	1	30				" "
3		1420- -1450	1	30				" "
4		1450- -1520	1	30				" "

Safety and Health Physics

SAMPLED BY K. Lowery & B. Trivett TK 1/3/63 SUPERVISOR DATE RELEASED

UCN-3905 (1 11-62)

5

6

INDUSTRIAL HYGIENE FIELD SAMPLING REPORT

DATE OF SERVICE TRIP 12/26/62 BUILDING K-1024 ROUTINE [x] SPECIAL [ ] REPORT NO. 948 REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
	Room 27							
1	IN FRONT of Cleaning Hood	0945			NO_2		0 PPM	
2	By Alcohol Container	1000			Isopropanol		0 PPM	
3	By Table, middle of Room	1020						
4	By Degreaser	1050			PCE		0 PPM	

NO_2 - 1-0.
Isopropanol 1-0.

PCE - 1-0.
F.L - 3-0!

TK 1/14/63

SUPERVISOR W.H. Smith

DATE RELEASED

JW

INDUSTRIAL HYGIENE FIELD SAMPLING REPORT

DATE OF SERVICE TRIP 12/26/62 BUILDING K-1024 ROUTINE ☑ SPECIAL ☐ REPORT NO. 949 REQUESTED BY

SAMPLE NUMBER	SAMPLING LOCATION	SAMPLING TIME	SAMPLING RATE	SAMPLING VOLUME	CONTAMINANT	TOTAL mg.	CONCENTRATION	OBSERVATIONS
1	North end of Building	0930-1000	1	30	F_2	0.04	<0.1 PPM	intermittant odor of F_2
2	" " "	1000-1030	1	30	F_2	0.01	<0.1	
3	" " "	1030-1100	1	30	F_2	0.03	<0.1	

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SAMPLED BY J. K. Lawery TK 1/4/63 SUPERVISOR W. W. Smith DATE RELEASED

COPY TO: J. M. Ellis
File

INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 374
Routine X
Special
Requested by
Date 1-17-63

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	11-14-62	Room 21 By cleaning hood	- 1445 -	Nitrogen Dioxide	0 ppm	Acid in containers in hood.
		By container of Isopropanol	- 1510 -	Isopropanol	0 ppm	

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ISSUED BY: D. L. Stoddard

COPY TO: J. M. Ellis
File

INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 345 JW.
Routine X
Special
Requested by
Date November 27, 1962

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	9-20-62	Pneumatic Area			0.00 mg/m3	
		Table No. 1	1300	Mercury	0.00 mg/m3	
		Table No. 2			0.00 mg/m3	
		Table No. 3			0.00 mg/m3	
		Table No. 4			0.00 mg/m3	
		Table No. 5			0.00 mg/m3	
		Table No. 6			0.00 mg/m3	
		Table No. 7			0.00 mg/m3	
		Table No. 8			0.00 mg/m3	
		Table No. 9			0.06 mg/m3	By employee's head as he was filling instrument with mercury.
		Table No. 10	1330			
		Table No. 11	1350		0.04 mg/m3	droplets of mercury on table.
		Room 19			0.00 mg/m3	
		Table, East Side	1355		0.00 mg/m3	
		Table, West Side	"		0.00 mg/m3	
		Northwest Corner	1415		0.00 mg/m3	
		Room 20	1420			
		Room 21			0.02 mg/m3	Few droplets of mercury on table.
		Table, Middle of Room	1425			
		By Container of Isopropyl	1435	Isopropyl Alcohol	0 ppm	
		In Front of Cleaning Hood	1445	Nitrogen Dioxide	0 ppm	

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WCX-2512 (9-55) K-25 RC Medical Department

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 345 Page 2
Routine
Special
Requested by
Date November 27, 1962

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	9-20-62	Mer Vac Cleaner USA UCNC No. 229102 *				
		At Exhaust Port	1450	Mercury	0.01 mg/m3	Motor Off
		1 ft. from Exhaust Port			0.00 mg/m3	
		Head Level			0.00 mg/m3	
		At Exhaust Port			0.06 mg/m3	Motor On
		1 ft. from Exhaust Port			0.02 mg/m3	
		Head Level			0.01 mg/m3	

*This machine is fit for continued use.

10

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A. F. Becher
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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 216
Routine X
Special
Requested by
Date 5-13-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	5-17-62	Pneumatic Area Table No. 1	1445 -	Mercury	0.00 mg/m3	
		Table No. 2			0.00 mg/m3	
		Table No. 3			0.00 mg/m3	
		Table No. 4			0.00 mg/m3	
		Table No. 5			0.00 mg/m3	
		Table No. 6			0.00 mg/m3	
		Table No. 7			0.00 mg/m3	
		Table No. 8			0.00 mg/m3	
		Table No. 9			0.00 mg/m3	
		Table No. 10			0.00 mg/m3	
		Table No. 11	- 1550		0.00 mg/m3	
		Room 17	- 1500 -		0.00 mg/m3	Droplets of mercury on floor at north end of room.
		Room 19	- 1510 -		0.00 mg/m3	
		Room 20	- 1520 -		0.00 mg/m3	

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 216 Page 2
Routine X
Special
Requested by
Date 6-13-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	5-17-62	Mer-Vac Cleaner USA - UCNC No. 229102#				
		At exhaust port	1540 -	Mercury	0.01 mg/m^3	Motor off.
		One foot from port			0.00 mg/m^3	"
		Head level			0.00 mg/m^3	"
		At exhaust port			0.08 mg/m^3	Motor on.
		One foot from port			0.06 mg/m^3	"
		Head level	- 1555		0.04 mg/m^3	"

Hg-14-1

Misc. 6-0

12

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 135
Routine X
Special
Requested by
Date 5-7-62

13

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	4-24-62	Pneumatic Area Table No. 1	1530 -	Mercury	0.00 mg/m^3	
		Table No. 2			0.00 mg/m^3	
		Table No. 3			0.00 mg/m^3	
		Table No. 4			0.00 mg/m^3	
		Table No. 5			0.00 mg/m^3	
		Table No. 6			0.00 mg/m^3	
		Table No. 7			0.00 mg/m^3	
		Table No. 8			0.00 mg/m^3	
		Table No. 9			0.00 mg/m^3	
		Table No. 10			0.00 mg/m^3	
		Table No. 11	- 1545		0.00 mg/m^3	
		Room 17	- 1547 -		0.00 mg/m^3	
		Room 19	- 1555 -		0.00 mg/m^3	
		Room 20	- 1600 -		0.00 mg/m^3	

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 141
Routine X
Special
Requested by
Date 3-27-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	3-21-62	Pneumatic Area				
		Table 2	1520 -	Mercury	0.00 mg/m^3	
		Table 3			0.00 mg/m^3	
		Table 4			0.00 mg/m^3	
		Table 5			0.00 mg/m^3	
		Table 6			0.00 mg/m^3	
		Table 7			0.00 mg/m^3	
		Table 8			0.00 mg/m^3	
		Table 9			0.00 mg/m^3	
		Table 10			0.00 mg/m^3	
		Table 11	- 1540		0.00 mg/m^3	
		Room 17	- 1545 -		0.00 mg/m^3	
		Room 19	- 1555 -		0.00 mg/m^3	
		Room 20	- 1605 -		0.00 mg/m^3	

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WCX-2512 (9-55) K-25 RC Medical Department

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 100
Routine X
Special
Requested by
Date 3-8-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	2-23-62	Pneumatic Area By table No. 1	1335 -	Mercury	0.00 mg/m^3	
		No. 2			0.00 mg/m^3	
		No. 3			0.00 mg/m^3	
		No. 4			0.02 mg/m^3	
		No. 5			0.00 mg/m^3	
		No. 6			0.00 mg/m^3	
		No. 7			0.00 mg/m^3	
		No. 8			0.00 mg/m^3	
		No. 9			0.00 mg/m^3	
		Top of table No. 10 Northwest corner			0.28 mg/m^3	Droplets of mercury along table top and metal edge.
		Northeast corner			0.27 mg/m^3	"
		Middle			0.22 mg/m^3	"
		Table No. 11 Southeast corner			0.40 mg/m^3	"
		Southwest corner			0.64 mg/m^3	"
		South side			0.30 mg/m^3	"
		Head level			0.04 mg/m^3	"

Hg 18

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WCX-2512 (9-55) K-25 RC Medical Department

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 100 Page 2
Routine X
Special
Requested by
Date 3-8-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	2-23-62	Room 17 By table No. 12		Mercury	0.00 mg/m^3	
		No. 13			0.00 mg/m^3	
		No. 14			0.00 mg/m^3	
		No. 15			0.00 mg/m^3	
		No. 16			0.00 mg/m^3	
		No. 17			0.00 mg/m^3	
		Room 19			0.00 mg/m^3	
		Room 20	- 1450		0.00 mg/m^3	

This table top should be mopped with 0.5% sodium hypochlorite solution (Chlorox) and then rechecked.

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 32
Routine X
Special
Requested by
Date 2-2-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	1-18-62	Room 17	1550 -	Mercury	0.00 mg/m^3	
		Pneumatic Area			0.00 mg/m^3	
		Room 19			0.00 mg/m^3	
		Room 20			0.00 mg/m^3	

Hg 4

17

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 27
Routine X
Special
Requested by
Date 1-30-62

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	1-18-62	Mer-Vac Cleaner, USA - UCNC No. 229102*				
		At Exhaust Port	1610 -	Mercury	0.04 mg/m^3	Motor Off
		One foot from Exhaust Port			0.01 mg/m^3	"
		Head level			0.00 mg/m^3	"
		At Exhaust Port			0.06 mg/m^3	Motor On
		One foot from Exhaust Port			0.04 mg/m^3	"
		Head level	- 1625		0.02 mg/m^3	"

*This device is fit for continued use.

18

4/1 2 6

ISSUED BY: W. L. Stoddard

19

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 415
Routine X
Special
Requested by
Date 10-20-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	9-28-61	Pneumatic Area	1545	Mercury	0.00 mg/m^3	
		Room 17	1550		0.00 mg/m^3	
		Room 20 Table at south side	1600		0.00 mg/m^3	Few droplets of mercury on table.
		By alcohol container	1605	Isopropanol	0 ppm	Container closed.
		Room 19	1610	Mercury	0.00 mg/m^3	
	10-12-61	Pneumatic Area	1525		0.00 mg/m^3	
		Room 17	1535		0.00 mg/m^3	
		Room 19	1540		0.00 mg/m^3	
		Room 20	1545		0.00 mg/m^3	
		By alcohol container	1550	Isopropanol	0 ppm	Container closed.
	9-28-61	Mer-Vac Cleaner USA-UCNC No. 229102 At exhaust port	1530	Mercury	0.00 mg/m^3	Motor off.
		One foot from port			0.00 mg/m^3	"
		Head level			0.00 mg/m^3	"
		At exhaust port			0.04 mg/m^3	Motor on.
		One foot from exhaust port			0.02 mg/m^3	"
		Head level	- 1545		0.00 mg/m^3	"

Misc. 12
Hg 8

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20

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 415 Page 2
Routine X
Special
Requested by
Date 10-20-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
		* This device is fit for continued use.				
K-1024	10-12-61	Mer-Vac Cleaner USA-UCHC No. 229102 * At exhaust port	1505	Mercury	0.02 mg/m^3	Motor off.
		One foot from exhaust port			0.00 mg/m^3	"
		Head level			0.00 mg/m^3	"
		At exhaust port			0.10 mg/m^3	Motor on.
		One foot from exhaust port			0.04 mg/m^3	"
		Head level	- 1520		0.03 mg/m^3	"
		* This device is fit for continued use.				

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 339
Routine X
Special
Requested by
Date 8-22-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1074-A	8-2-61	West side	1328	Carbon Monoxide	10 ppm	Both doors open. Near front of vehicle in operation.
K-1024-C		East side	1331		40 ppm	Near rear of vehicle.
		Middle	1333		10 ppm	Inside cab of vehicle.

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 326
Routine X
Special
Requested by
Date 8-22-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	8-1-61	Mer-Vac Cleaner No. 229102 * By exhaust port	1041	Mercury	0.00 mg/m3	Motor off.
		One foot from exhaust	1042		0.00 mg/m3	
		Head level	1042		0.00 mg/m3	
		By exhaust port	1043		0.06 mg/m3	Motor on.
		One foot from exhaust	1044		0.02 mg/m3	
		Head level	1045		0.00 mg/m3	
		* This device is fit for continued use.				
		Pneumatic Area	1049		0.00 mg/m3	
		Room 17 Bench at east side	1053		0.00 mg/m3	
		By manometers in north-west corner	1057		0.01 mg/m3	

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 316
Routine X
Special
Requested by
Date 8-8-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	7-21-61	Mer-Vac Cleaner USA-UCNC 229102 * At exhaust ports	1350 -	Mercury	0.00 mg/m3	Motor off.
		One foot from exhaust ports			0.00 mg/m3	
		Head level			0.00 mg/m3	
		At exhaust ports			0.03 mg/m3	Motor on.
		One foot from exhaust ports			0.01 mg/m3	
		Head level	- 1405		0.00 mg/m3	
		* This device is fit for continued use.				
		Pneumatic area	1410		0.00 mg/m3	
		Room 17	1415		0.00 mg/m3	
		Room 20	1420		0.00 mg/m3	
		By alcohol bath	1425	Isopropanol	0 ppm	Container was covered.

23

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 284
Routine X
Special
Requested by
Date 6-29-61

24

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	6-22-61	Pneumatic Area	1430 - 1435	Mercury	0.00 mg/m3	
		Room 17	1435 - 1440		0.00 mg/m3	
		Glass Shop	1440 - 1445		0.00 mg/m3	
		Room 20	1445 - 1450		0.00 mg/m3	
			1410			
			1415	Isopropyl Alcohol	0 ppm	
		Mer-Vac Cleaner UCNC No. 229102 *				
		At exhaust port	1510	Mercury	0.05 mg/m3	Motor off.
		One foot from exhaust port	1512		0.02 mg/m3	
		Head level	1515		0.00 mg/m3	
		At exhaust port	1520		0.10 mg/m3	Motor on.
		One foot from exhaust port	1522		0.05 mg/m3	
		Head level	1525		0.00 mg/m3	

* This device is fit for continued use.

Hg 4+

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 239
Routine
Special X
Requested by L. Patrick
Date 5-23-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	5-17-61	Main Shop 20 feet west of column H-10, south side of table	1017 - 1027	Cadmium Zinc	0.01 mg/m3 <0.01 mg/m3	By employee silver soldering.
		North side of table	1017 - 1027		0.04 mg/m3 0.01 mg/m3	Vapor from soldering drifted toward this sampler.

1724

CHEMICAL URINE ANALYSIS CARD

Payroll No. 3734 Date 0945, 5/17,61

Completion Date 12/15, 5/17/61 Recall Letter SPECIAL

1 Code		Results
2 Code		Results
3 Code		Results
4 Code		Results
other Code	Cd.	Results < 1

PPM

Area of Responsibility

JUN 8 1961

25

WCX-2512 (9-55) K-25 RC Medical Department

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Safety
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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 171
Routine X
Special
Requested by
Date 4-21-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	4-6-61	Pneumatic Area Table 3	1542	Mercury	0.00 mg/m3	
		Table 4	1545		0.01 mg/m3	Few droplets mercury present.
		Room 17 Table at east side	1548		0.00 mg/m3	
		Northwest corner	1550		0.00 mg/m3	
		Mer-Vac Cleaner No. 229102* Exhaust port	1552 -		0.00 mg/m3	Motor off.
		One foot from port			0.00 mg/m3	
		Head level			0.00 mg/m3	
		Exhaust port			0.02 mg/m3	Motor on.
		One foot from port			0.00 mg/m3	
		Head level	- 1558		0.00 mg/m3	

*This machine is fit for continued use.

26

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WCX-2513 (9-55) K-25 RC Medical Department

27

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 79
Routine X
Special
Requested by
Date 2-15-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	2-2-61	Pneumatic Area	1425 - 1430	Mercury	0.00 mg/m3	
		Room 17 Table, east side	1431		0.00 mg/m3	
		By calibration stand	1432		0.00 mg/m3	Head level.
		By pump of calibration stand	1432		0.01 mg/m3	In operation.
		Base of calibration stand	1434		0.09 mg/m3	
		Inside stand	1435		0.01 mg/m3	
		Mer-Vac cleaner C&CCC No. 229102 * By exhaust port	1413		0.01 mg/m3	Motor off.
		One foot from exhaust port	1414		0.00 mg/m3	
		Head level	1416		0.00 mg/m3	
		By exhaust port	1418		0.06 mg/m3	Motor on.
		One foot from exhaust port	1419		0.00 mg/m3	
		Head level	1420		0.00 mg/m3	

*This device is fit for continued use.

ISSUED BY: D. L. Stoddard

28

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 31
Routine X
Special
Requested by
Date 1-25-61

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1024	1-3-61	Mer-Vac Cleaner, USA-CCCC No. 229102 *				
		By exhaust port	1404	Mercury	0.14 mg/m3	Motor off.
		One foot from port	1405		0.01 mg/m3	
		Head level	1406		0.01 mg/m3	
		By exhaust port	1407		0.06 mg/m3	Motor on.
		One foot from port	1408		0.04 mg/m3	
		Head level	1409		0.01 mg/m3	
		* This machine is fit for continued use.				
		Pneumatic area	1410 - 1414		0.00 mg/m3	
		Room 17	1414 -1418		0.00 mg/m3	
		Room 20	1418 - 1420		0.00 mg/m3	

DISTRIBUTION

1. K-25 Site Records (RC)
2. ChemRisk/Shonka Research Associates
3. DOE Public Reading Room
4. S. G. Thornton (K-25 EMD)

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Susan Flack — ERDMC (K-1420)

Requestor — Document Center (is requested to provide the following document)

Date of request 10/29/96 — Expected receipt of document ASAP

Document number ER005565 K/HS-139 — Date of document ______

Title and author (if document is unnumbered)

______

(This section to be completed by Document Center)

Date request received 10/31/96

Date submitted to ADC NA - Previously Released 10/5/87

Date submitted to HSA Coordinator 10/31/96

(This section to be completed by HSA Coordinator)

Date submitted to CICO N/A

Date received from CICO NA

Date submitted to ChemRisk/Shonka and DOE 11/4/96

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received ______

Signature ______

87-0019

K/HS-139

ORGDP

OAK RIDGE
GASEOUS
DIFFUSION
PLANT

MARTIN MARIETTA

RCRA FACILITY INVESTIGATION PLAN
K-1420 MERCURY ROOM
OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

NOVEMBER 1987

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

NOVEMBER 1987

K/HS-139

RCRA FACILITY INVESTIGATION PLAN
K-1420 MERCURY ROOM
OAK RIDGE GASEOUS DIFFUSION PLANT
OAK RIDGE, TENNESSEE

Prepared by the
Oak Ridge Gaseous Diffusion Plant
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

TABLE OF CONTENTS

1. INTRODUCTION

Within the confines of the Oak Ridge Gaseous Diffusion Plant (ORGDP) are hazardous waste treatment, storage, and disposal facilities; some are in operation while others are inactive. These solid waste management units (SWMUs) are subject to assessment by the U.S. Environmental Protection Agency (EPA), as required by the 1984 Hazardous and Solid Waste Amendments (HSWA) to the Resource Conservation and Recovery Act (RCRA). The RCRA Facility Investigation (RFI) Plans are scheduled to be submitted for all the SWMUs during calendar years 1987 and 1988. RCRA Facility Investigation Plan-General Document (K/HS-132) includes information applicable to all the ORGDP SWMUs and serves as a reference document for the site-specific RFI Plans.

This document is the site-specific RFI Plan for the K-1420 Mercury Recovery Room. Contained within this document are geographical, historical, operational, geological, and hydrological data specific to the K-1420 Mercury Recovery Room. This plan addresses possible contamination from the mercury recovery room and the drain lines under the K-1420 building; the portion of the drain lines outside the building will be addressed in the K-1420 Waste Area Grouping RFI. The potential for release of contamination through the various media to receptors is considered. A sampling plan is proposed to determine the extent (if any) of release of contamination to the surrounding environment. Health, safety, quality assurance (QA), and quality control (QC) procedures to be followed when implementing the sampling plan are included. Procedures for managing and displaying data collected from the RCRA Facility Investigation are summarized.

2. OBJECTIVES OF RCRA FACILITY INVESTIGATION PLANNING

2.1 OBJECTIVES

The RFI Plan will identify actions necessary to determine the nature and extent of releases of hazardous and/or radioactive contamination from the K-1420 Mercury Recovery Room. The plan summarizes existing site information and addresses the potential for contamination of soil, ground-water, surface water, and air pathways.

2.2 EVALUATION CRITERIA

In order to prepare and implement a comprehensive sampling plan and to effectively evaluate analytical sampling results, evaluation criteria must first be established. Criteria for evaluating the extent of contaminant release are based on existing state and federal regulatory guidance and best technical judgment.

The primary medium of interest for the K-1420 Mercury Recovery Room is air. Air samples will be collected as a part of the RCRA Facility Investigation and analyzed for the contaminants as described in Section 8 of this document. The sampling methodology and analytical procedures are designed to characterize the contaminants of interest at or below levels summarized in Table 2.2 of the RFI Plan-General Document (K/HS-132).

2.3 SCHEDULE FOR SPECIFIC RFI ACTIVITIES

A list of the sampling and analysis activities that will be performed for the K-1420 RFI and the duration of each activity is shown in Table 2.1.

Table 2.1. Duration of RFI activities for the K-1420 Mercury Recovery Room

Activities	Duration
1. Preparation of site	
(a) remove equipment and containers of stored mercury	4 weeks
(b) scrub floor, walls, ceiling	1 week
2. Collection of samples	
(a) air samples	2 weeks
(b) chip samples (if necessary)	4 weeks
3. Analysis of samples	
(a) air samples	10 weeks
(b) chip samples (if necessary)	10 weeks
4. Compilation of data and data presentation	8 weeks
5. Evaluation of results and recommendations	2 weeks
6. Preparation of RFI report and submittal to EPA	8 weeks
7. Additional sampling phases/remedial actions as needed	TBD

2.4 FEASIBLE ALTERNATIVES

Knowledge of feasible corrective measures has been used in preparing the RCRA Facility Investigation Plan. Based on existing contaminant source data, potential corrective measures for the K-1420 Mercury Recovery Room have been identified and are shown in Table 2.2. These corrective measures will be re-evaluated after the RFI report is completed.

2.5. RISK ASSESSMENT

The environmental and public health risk associated with the remedial action alternatives listed in Table 2.2 will be evaluated. This evaluation will consist of a characterization of contaminant sources, the magnitude of release, the environmental setting, pathways to human exposures, and characterization of risks. Risk assessment began early in the RFI process and is useful for determining data requirements and site sampling plans.

Table 2.2 Potential corrective measures for the K-1420 Mercury Recovery Room

1. **Room**

   Option A: Scrub room (floor, ceiling and walls)

   Option B: Scrub room (floor, ceiling and walls)
   Remove floor paint
   Remove 1/2 to 1 inch of concrete floor
   Scrape walls and ceiling where possible

2. **Ventilation System**

   Option A: Clean ducts

   Option B: Remove ventilation system and replace if necessary

3. **Sink Drain**

   Immobilize mercury in drain line
   Seal sink drain
   Grout and cap sink drain line where it exits the K-1420 building

3. DESCRIPTION OF CURRENT CONDITIONS

3.1 GEOGRAPHICAL INFORMATION

The K-1420 Mercury Recovery Room is in Building K-1420 which is located on the northeast side of the ORGDP within the security perimeter fence. Thus, access to the mercury recovery room is restricted to authorized personnel. A location map of the site is shown in Figure 3.1.

3.2 HISTORICAL INFORMATION

During the 1960s and 1970s, operations in the K-1420 Mercury Recovery Room included cleaning used mercury and recovering mercury from mercury-bearing wastes with a distillation process. A change in the allowable concentration limits for airborne mercury under the National Emission Standards for Hazardous Air Pollutants (NESHAP) required upgrading of the mercury recovery room's ventiliation system. The ORGDP management decided not to renovate the exhaust system, and the mercury recovery operation was shut down in the early 1980s.

Presently, the room contains the ventilation hoods, distillation equipment, and other equipment associated with the recovery process. Mercury-bearing wastes and used mercury are sent to the mercury recovery room to be packaged in appropriate containers.

3.3 OPERATIONAL INFORMATION

The mercury recovery room is located on the ground floor of Building K-1420. Figures 3.2 and 3.3 show the location of the room and the associated piping. The effluent from the room's drain lines discharged into the K-1407-B Holding Pond.

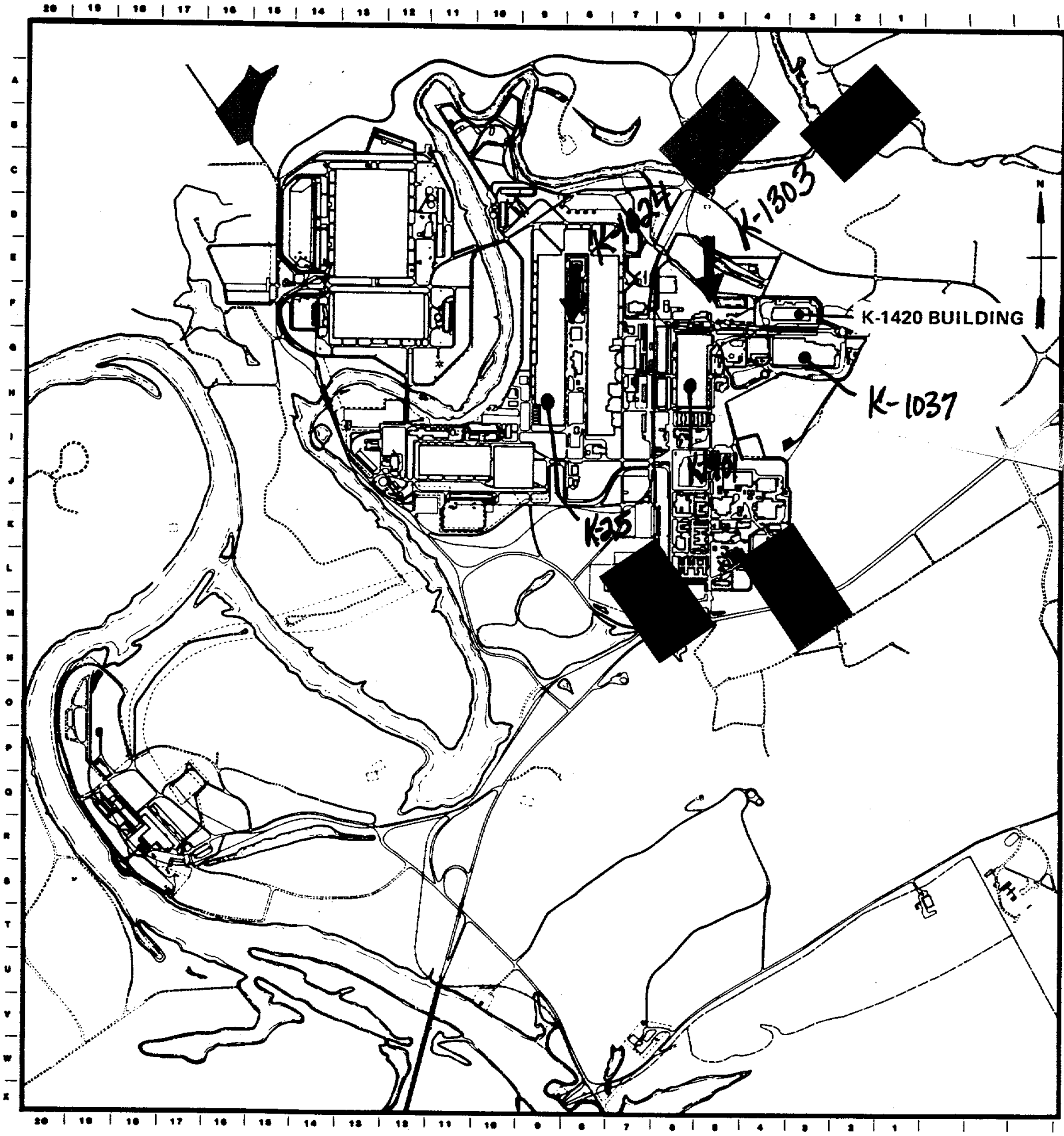

Fig. 3.1. ORGDP Location Map of the K-1420 Building

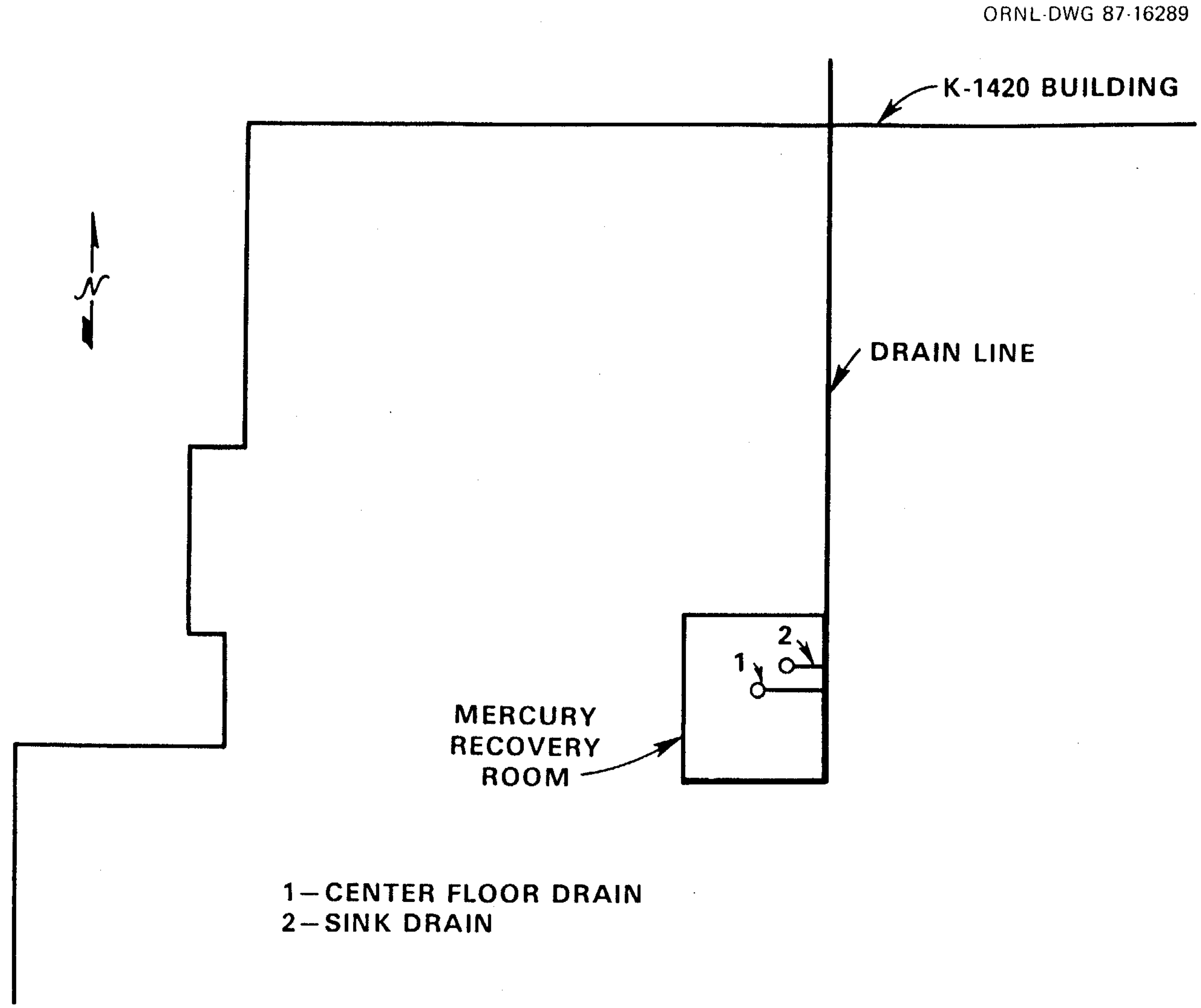

Fig. 3.2 The K-1420 Building and Location of the K-1420 Mercury Recovery Room

ORNL-DWG 87-16290

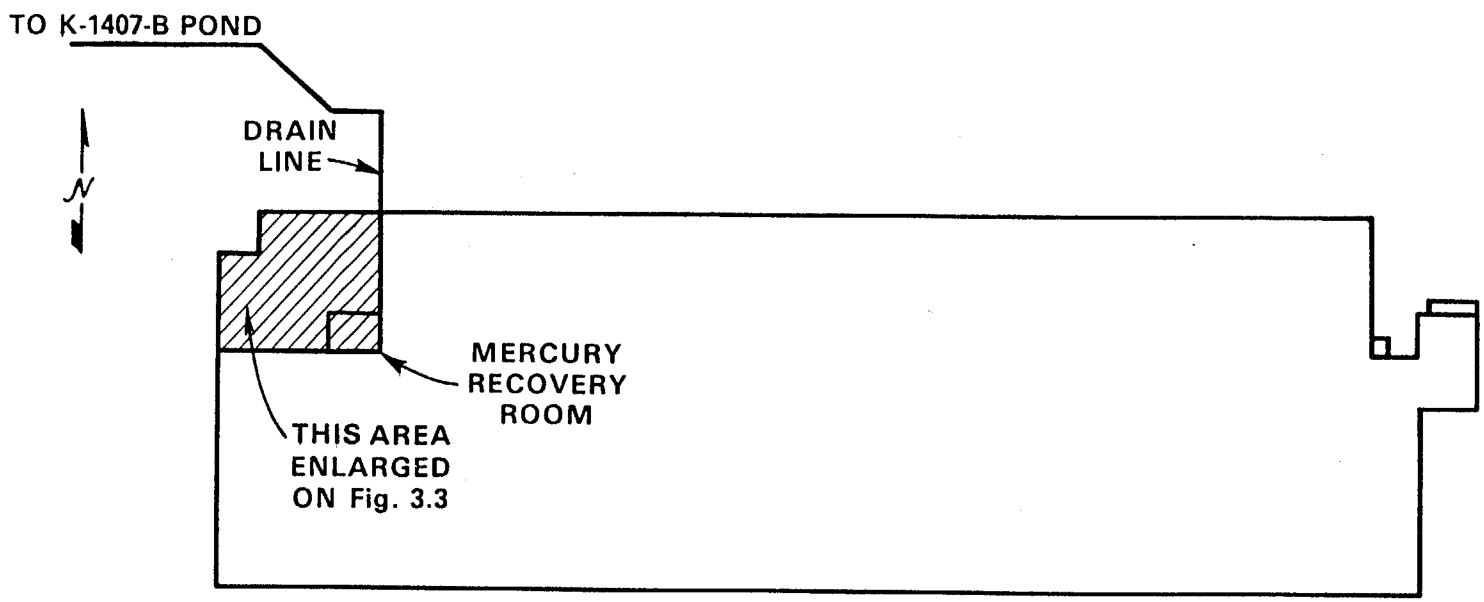

Fig. 3.3. Drain Lines Associated with the K-1420 Mercury Recovery Room

A triple distillation process consisting of three stills in series was used for the purification of elemental mercury. In each of the distillation units, the mercury was vaporized and condensed. In the third unit, the mercury was condensed into a recovery bottle and water decanted so that only ultrapure mercury (99.9+%) remained in the recovery bottle. At the onset of the operation, glass recovery bottles, able to hold eight pounds of mercury, were used. The glass bottles were later replaced with plastic bottles holding six to eight pounds of mercury. These bottles were packaged in special crates and shipped to various government agencies.

Since mercury recovery was the principal objective, measures were taken to prevent spills. Mercury contaminated wastes and used mercury were washed with nitric acid in a 2.5 - 5.0 gallon container in the sink. The sink contained a standpipe which prevented materials from entering the drain at the sink level. Washed solutions were then transferred to the distillation units. Spills associated with the distillation units were contained in a curbed area beneath these stills. A floor drain in the center of the mercury recovery room was raised from the floor level, preventing most spills from entering the drain line.

Despite measures to contain mercury inside the room, mercury was found in the center floor drain when the line was accidently punctured. To immobilize the mercury the line was grouted and capped where the line exits from the K-1420 building and the floor drain in the mercury recovery room was sealed.

During operations at the mercury recovery room, the concrete floor (except for the curbed area beneath the distillation units) was painted with an oil base paint. However, the painting was primarily for aesthetic reasons and not for the purpose of providing a seal to prevent movement of mercury through the floor to the ground surface underneath the building.

4. CHARACTERIZATION OF THE CONTAMINANT SOURCE

Records of the quantities of mercury-bearing wastes and used mercury processed in the K-1420 Mercury Recovery Room and the amount of ultrapure mercury recovered are not available. The Y-12 Plant generated most of the wastes processed by the mercury recovery operation.

5. CHARACTERIZATION OF THE ENVIRONMENTAL SETTING

5.1 HYDROGEOLOGY

The Geraghty and Miller, Inc. report, Requirements for Groundwater Monitoring at 39 Waste Management Sites at the Oak Ridge Gaseous Diffusion Plant (K/SUB/22224C/7), indicates that if mercury releases from floor penetration or drain line leaks in the mercury recovery room occurred, it is unlikely that the soil or groundwater beneath the K-1420 building became pathways for mercury migration. The shale and limestone bedrock beneath the K-1420 building contains iron, manganese, and sulfur which are available for chemical bonding with the mercury. These species also persist in oxidized form in the overburden and soil, making mobilization of mercury in the soil improbable. Analyses of water samples from monitor well UNW-7, a few hundred feet downgradient from Building K-1420, show pH values ranging from 6.4 to 6.9. Therefore, the groundwater is not sufficiently acidic to mobilize heavy metals such as mercury.

5.2 AIR

Due to the volatility of elemental mercury, the most likely pathway of contaminant migration is atmospheric transport. The ventilation system within the K-1420 Mercury Recovery Room is not routinely monitored for air quality and/or mercury contamination. Although there are no site-specific air monitoring data available concerning the air flow direction and air quality, air data for the ORGDP are addressed in RFI Plan-General Document (K/HS-132).

6. IDENTIFICATION OF POTENTIAL PATHWAYS AND RECEPTORS

Assessments of inactive hazardous waste disposal or storage sites are required to evaluate the site's potential for health or safety risks to the environment, public and personnel. Determination of such risks must be based on evaluations of both the potential pathways of contaminant migration from toxic releases and the possible receptors of the contamination. Information used in the evaluations of the pathways which might release contaminants from the K-1420 Mercury Recovery Room has been obtained from interviews with persons having knowledge of the operations carried on in the room. RFI Plan-General Document (K/HS-132) will serve as a general reference concerning the potential pathways and receptors for the ORGDP.

The operational history of the K-1420 Mercury Recovery Room suggests that atmospheric transport is the primary pathway of concern. Drain lines which exit the mercury recovery room present some potential for contaminant release to the soil and groundwater beneath the building. Contamination of surface water or vegetation are not likely due to the location of the mercury recovery room and thus will not be evaluated as pathways of contaminant migration.

6.1 POTENTIAL PATHWAYS OF MIGRATION

6.1.1 Soil and Groundwater

The possiblity of contaminant release to the soil and groundwater beneath the building would come from leakage of the drain lines which exit the room or from contaminant movement through the concrete flooring. Operational protocol would have prevented accumulation of mercury on the floor and therefore the loss of large amounts of mercury through penetration of the floor is unlikely. Spills which occurred during the washing process in the sink or in the recovery process at the distillation units were prevented from entering the sink or floor drains. It is not suspected at this time that soil or groundwater contamination exists, but if contaminant release from the mercury recovery room did occur, the general clay-rich composition of ORGDP soils and the presence of oxidized ions of iron, manganese, and sulphur would tend to immobilize the mercury in the soils. If analyses of floor paint chips and associated air samples (Section 8.2.1, Phase III) indicate unacceptable contaminant levels, soil and groundwater sampling will be performed.

6.1.2 Air

Due to the volatility of elemental mercury, atmospheric transport is the pathway of greatest concern in the mercury recovery room. Samples of air within the room, ventilation ducts, and the ventilation exhausts will be taken as part of each sampling phase to determine the nature and extent of contamination.

6.2 POTENTIAL RECEPTORS

6.2.1 Human Populations

The institutional controls exercised by the Department of Energy at the ORGDP prevent public access to the K-1420 Mercury Recovery Room. Thus, only ORGDP employees are likely to have been exposed to airborne mercury.

6.2.2 Terrestrial Fauna and Flora

The RFI Plan-General Document (K/HS-132) discusses the rare, threatened, and endangered plant and animal species which are thought to inhabit the area. None of these species have been reported in the vicinity of the K-1420 building. Possible releases from the recovery room are not anticipated to affect the local flora and fauna.

7. EXISTING MONITORING DATA

A preliminary investigation of the K-1420 Mercury Recovery Room (analysis of air samples for mercury vapor) was completed in 1986. Nine locations within the room were sampled and compared to a background sample collected outside of the room. The procedures and results of the investigation are reported in Sampling and Analysis Plan K-1420 Mercury Recovery Room (K/QT-128).

The results of the preliminary characterization showed mercury vapor concentrations that ranged from 0.1 to 8.2 mg/m^3. The current NIOSH threshold limit value for mercury vapor concentrations in work areas is 0.05 mg/m^3 (TLV). Since areas of the room were covered with plastic during sampling in order to concentrate any mercury vapor present, the typical level in the room may not approach the levels measured. The levels measured, however, do indicate airborne mercury at concentrations requiring corrective measures.

8. SAMPLING PLAN

8.1 SAMPLING AND ANALYTICAL STRATEGY

Throughout the existence of the K-1420 Facility, the K-1420 Mercury Recovery Room has been dedicated to the recovery, purification, and packaging of metallic mercury. Since the only hazardous substance handled within the room has been mercury and the movement of airborne mercury is the major migration pathway of concern, only analysis for mercury contamination will be conducted.

8.2 STATISTICAL SET-UP FOR SAMPLING

8.2.1 Air Sampling

Each phase of the investigation will consist of sampling, chemical analyses, and statistical analysis of resultant data. This will continue until conclusions can be drawn regarding the extent of the release and decisions can be made about appropriate remedial actions. Prior to sampling, equipment in the mercury recovery room will be removed and the floor, walls, and ceiling will be cleaned.

Phase I consists of air samples being taken from distinct areas of the room including the floor, sink drain, ventilation hood, and air ducts. Samples will be taken at three locations in the duct work: in the room, outside the room, and at the exhaust end of the ventilation system on the roof. Background readings will be taken in two other ventilation system exhausts on the roof. The air in the sink drain will also be sampled. If the drain is found to be contaminated, the mercury will be immobilized, the drain isolated, and remedial action recommended. There will be two repeat air samples taken above the floor. Also, the air above the floor in the traffic area just outside the mercury recovery room will be sampled. A background reading will be taken in a different room in the building believed to be free of mercury contamination. Air in the floor drain will not be sampled as the drain has been sealed at its exit from the mercury recovery room.

Phase II consists of cleaning and resampling any discrete area of the room found to have contamination greater than 0.05 mg/m^3 (TLV) in Phase I. If the floor area continues to have contamination greater than the TLV, Phase III would involve taking 10 paint chip samples at randomly determined locations from the floor. If contamination is found in the floor chip samples, air samples will be taken above the concrete floor where the paint has been removed.

8.2.2 Soil and Groundwater Sampling

No soil or groundwater sampling will be carried out specifically for Phases I, II, III of this investigation.

8.3 FIELD SAMPLING

8.3.1 Site Preparation

Prior to sampling efforts, any visible traces of mercury will be removed from the mercury recovery room. In addition, any contaminated equipment and/or any containers of stored mercury shall be removed from the room. The room will be scrubbed with an appropriate wash solution to oxidize the mercury, e.g., chlorine bleach.

Plastic film will cover the floor to contain any mercury vapor which might arise. The plastic will keep the mercury vapor concentrated, facilitating its collection by reducing the volume of air available for dilution.

8.3.2 Equipment and Supplies

The following sampling supplies will be required:

- Mercury Vapor Collection Tubes - charcoal impregnated with KI and iodine as described in Procedure IHA-150 (Appendix).
- Air Pump - capable of pumping air through the mercury collection tubes at a flow rate of 0.2 liters per minute.
- Flowmeter - for measuring a flow of 0.2 liters per minute.
- Polyflo Tubing - for connecting collection tubes to air pump.
- Logbook
- Chain of custody seals
- Sample labels
- Chain of custody forms

8.3.3 Sampling Procedure

The procedure used for the analysis of mercury vapor in the air will be Industrial Hygiene Analysis Procedure (IHAP), "Mercury in Air, Flameless AA Method" (IHA-150). This procedure is described in the Appendix.

For each of the locations identified in Section 8.2.1, a sampler consisting of a collection tube connected to a vacuum pump with polyflo tubing will be set up. The pump will be started and the flow rate adjusted to 0.2 liters per minute. Samples will be collected for 24 hours.

At the end of the sampling period, the pumps will be stopped and the ends of the sampling tubes will be sealed. Each sample will be labeled with date, time, sample number, and sampler's name. Sample date, site identification, time, sample identification number, sampler's name, and sample location will also be recorded in the logbook. In addition to the required entries, any other pertinent information and/or observations shall be recorded. The logbook used for these records will contain a map of the area and the sampling plan.

The samples shall be sealed and transported to the laboratory under chain of custody protocol as referenced in Section 7.4 of the RFI Plan-General Document (K/HS-132).

8.4 ANALYTICAL PROTOCOL

Since the only hazardous substance handled in the K-1420 Mercury Recovery Room was metallic mercury, it constitutes the only analysis parameter. Further, since migration of mercury vapor through the K-1420 ventilation system appears to be the major mode of transport of mercury from the mercury recovery room, the concentration of mercury within the ventilation system will be evaluated.

8.5 SAMPLE ANALYSIS

Samples will be analyzed for metallic mercury using procedure IHA-150. (See Appendix.)

The front and back sections of the tubes will be analyzed separately for the purpose of confirming sufficient collection efficiency if high concentrations of mercury are found.

The QA/QC requirements outlined in Section 7.3 of the RFI Plan - General Document (K/HS-132) shall be adhered to for all analyses.

9. DATA MANAGEMENT PROCEDURES

The results of the chemical analyses of sampled areas will be presented in a clear and logical format, to best illustrate any patterns in the data. These will include tabular and graphical displays such as those described in Table 8.1 of the RFI Plan-General Document (K/HS-132).

Due to the limited number of samples that will be taken in any one area of the mercury room, statistical analyses will most likely consist of an examination for statistical outliers and a t-test of the investigative samples versus background samples. Values which are recorded as less than detection limits will be handled according to RCRA Ground-Water Monitoring Enforcement Guidance Document (OSWER-9950.1, September, 1986), which directs calculation through the use of Cohen's statistical methodology. This is found in "Tables for Maximum Likelihood Estimates from Single Truncated and Singly Censored Samples" (Technometrics, 3: 535-541, 1961).

10. HEALTH AND SAFETY PROCEDURES

10.1 INTRODUCTION

Special requirements and procedures to protect the health and safety of the investigating team, the ORGDP site personnel, and the general public during the RCRA Facility Investigation of the K-1420 Mercury Recovery Room are addressed in this section.

The RFI Plan-General Document (K/HS-132) details the health, safety, environmental, security and plant protection, and emergency response organizations which provide support to the ORGDP line organizations to meet the requirements for health and safety during the RFIs. They provide the communication, response, and reporting for any plant emergency; on-site medical facilities with medical surveillance, treatment, monitoring, and periodic physical examinations; health physics and industrial hygiene surveillance hazard evaluation and control; operational safety accident prevention and control; plant security and visitor control.

In addition, the general document identifies the organizational responsibilities for health and safety at the solid waste management unit (SWMU) sites during the RFIs. The document includes the methodology for establishing the work zones of each SWMU, the level of protection required in the exclusion zone, decontamination procedures, personnel exposure limits, monitoring requirements, and respiratory protection requirements.

10.2 KNOWN HAZARDS AND RISKS

Substances of safety and health concern in the K-1420 Mercury Recovery Room and immediate environments are presented below.

Substances of Safety and Health Concern

Waste Solvents and Degreasing Agents	______	Sludge	______
Radioactive Wastes	______	Corrosive Liquids	______
Treated Industrial Wastes	______	Plating Wastes	______
Liquid Waste/Free Product Potential	______	Scrap Metal Wastes	______
Asbestos	______	Cleaning Solutions	______
PCB	______	Paint Wastes	______
Mercury	x	Nonhazardous Wastes	______
Misc. Soluble Organics	______	Misc. Volatile Organics	______
		Misc. Metals/ Radionuclides	______

The safety plan for the K-1420 Mercury Recovery Room SWMU is based upon the requirements described in Volume I, Section 6, of the draft document, RCRA Facility Investigation Guidance (October, 1986). The results from prior sampling of Building K-1420 establish the personnel protection as Level C for this SWMU.

10.3 LEVEL OF PROTECTION

The level of personnel protection and monitoring is designated below for air sampling.

Level Designation		Monitoring Parameters	
A		Airborne Pollutants	x
B		Explosion Potential	
C	x	Radiation	x
D			

10.4 DESIGNATION OF WORK AREA ZONES

The three zones, Exclusion, Contamination Reduction, and Support will be established for each phase of sampling in accordance with the methodology developed in Section 9 of the RFI Plan-General Document (K/HS-132). The safety equipment required for the designated level of protection and the decontamination procedures are also covered in K/HS-132.

10.5 EXPOSURE LIMITS

The Site Health and Safety Officer (SHSO) is responsible for limiting the exposure of workers to nonhazardous levels of radiation and airborne pollutants and to minimal physical/chemical contact that assumes continuous safety and health of the employee.

The K-1420 building is a "Contamination Control Zone" where administrative controls are in place to prevent spread of contamination. Where the potential for airborne contamination exists in K-1420, Level C protection measures are required. For the K-1420 Mercury Recovery Room, radiation monitoring for airborne contamination will be conducted where sampling is being performed that requires drilling of sheet metal ducts or concrete and concrete chipping. Should the reading exceed 0.1 mR/hr, the SHSO will order work to be stopped and the crew removed from the exclusion zone. The SHSO will request the presence of a health physicist on site who will assess the potential hazard of the conditions and determine whether or not work should continue or the level of protection increased.

For the K-1420 Mercury Recovery Room, mercury is the airborne pollutant that will be monitored. A real-time airborne mercury vapor monitor will be employed continuously to ascertain the level of mercury. If concentrations of airborne mercury fall below the TLV of 0.05 mg/m^3, the level of protection may be lowered to D, at the direction of the SHSO.

APPENDIX

INDUSTRIAL HYGIENE ANALYSIS PROCEDURE

UNION CARBIDE CORPORATION
NUCLEAR DIVISION
OAK RIDGE, TENNESSEE - PADUCAH, KENTUCKY

NUMBER	IHA-150
DATE	Nov. 27, 197
SUPERSEDES	
PAGE	1 OF 6

MERCURY IN AIR, FLAMELESS AA METHOD

Analyte:	Mercury	Method No.:	IHA-150
Matrix:	Air	Range:	0.05 - 1.0 total μg
Procedure:	Adsorption on treated charcoal, acid desorption, digestion; measured by flameless atomic absorption	Precision:	~5% RSD (estimated, not evaluated)
		Bias:	-3%

1.0 Principle of the Method

1.1 Air is drawn through a sampling tube containing activated charcoal impregnated with iodine and potassium iodide. The flow rate and sampling time are chosen to provide a representative workplace air sample.

1.2 The charcoal is digested in an acid-permanganate-persulfate solution at 95°C for 2 hours. Elemental mercury is then liberated by reduction with $SnSO_4$, and measured by flameless atomic absorption.

1.3 All forms of mercury--elemental, inorganic, organic--are determined by this method.

2.0 Range and Sensitivity

2.1 The normal working range is up to 1.0 μg of mercury. The lowest concentration reported is 0.05 μg.

2.2 Provision is made for extending the range to 10 μg.

3.0 Interferences

3.1 Organic compounds interfere by absorption at the 253.7 nm wavelength. This interference is minimized by the digestion step.

4.0 Precision and Accuracy

4.1 No precision studies have been made; however, specific amounts of mercury vapor were loaded on sampling tubes and analyzed by this method with the following results:

APPROVED BY Y-12	LAB A.J. McGlhaney	APPROVED BY ORGDP	LAB T. Kuwamoto	APPROVED BY UCCND-COORD	C W Weber
	IH W.S. Everett, Jr.		IH D.J. Duncan		
APPROVED BY PGDP	LAB R.E. Simmons	APPROVED BY ORNL	LAB W.R. Laing	NUMBER	IHA-150
	IH C.W. Turok		IH J.A. Early		

UCN-13234
(1 735 1-79)

μg Hg added	μg Hg found	Recovery, %
50	50.9	101.8
40	35.8	89.5
30	26.9	89.7
5	4.7	94.0
4	4.0	100.0
3	3.2	106.7

The average recovery was 97%.

5.0 Apparatus

5.1 Atomic absorption spectrophotometer, with an absorption cell at least 10-cm long x 2-cm I.D. with quartz endwindows.

5.2 Mercury hollow cathode lamp.

5.3 Strip-chart recorder.

5.4 Reagent bottles, 250-ml.

5.5 Gas supply: air, N_2, or argon.

5.6 Flowmeter, to deliver gas at 1 liter per minute.

5.7 Aerating tube: fitted with a straight cylindrical flat-end glass frit of coarse porosity.

5.8 Drying tube: a 15-cm x 19-mm O.D. tube packed with magnesium perchlorate desiccant. The apparatus is assembled as shown in Figure 1.

5.9 Water bath, capable of maintaining 95 ± 2°C.

5.10 Charcoal tubes: glass tube with both ends flame-sealed, 7 cm long with 6-mm O.D. and 4-mm I.D., containing 2 sections of 20/40 mesh activated charcoal separated by a 2-mm portion of urethane foam. The activated charcoal is prepared from coconut shells and is fired at 600°C and impregnated with 0.3% I_2 and 0.6% KI prior to packing. The absorbing section contains 100 mg of charcoal, the backup section 50 mg. A 3-mm portion of urethane foam is placed between the outlet end of the tube and the backup section.

These tubes, as described, are commercially available.

6.0 Reagents

All reagents are reagent grade and water is double-distilled or deionized.

6.1 Sulfuric acid, conc.

6.2 Sulfuric acid, 0.5 N: Add 14.0 ml of conc sulfuric acid to about 900 ml of water and dilute to 1 liter.

6.3 Nitric acid, conc: Reagent grade of low mercury content. TRANSISTAR grade (Mallinckrodt) is suitable. If this grade is not used, and a reagent blank of >0.05 μg is obtained, it will be necessary to distill the nitric acid.

6.4 Stannous sulfate suspension: Add 25 g of stannous sulfate to 250 ml of 0.5 N sulfuric acid. This mixture should be stirred continuously during use. (Stannous chloride may be used in place of stannous sulfate.)

6.5 Sodium chloride-hydroxylamine sulfate solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in water and dilute to 100 ml. (Hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate.)

6.6 Potassium permanganate, 5% solution (W/V): Dissolve 5 g of potassium permanganate in 100 ml of water.

6.7 Potassium persulfate, 5% solution (W/V): Dissolve 5 g of potassium persulfate in 100 ml of water.

6.8 Stock mercury solution: Dissolve 0.1354 g of mercuric chloride in 75 ml of water, add 10 ml of conc nitric acid, and dilute to 100 ml. 1 ml = 1 mg Hg.

6.9 Working mercury solution: Add 1 ml of the stock mercury solution to 1.5 ml of conc nitric acid and dilute to 1000 ml with water. 1 ml = 1 μg Hg. This solution is stable for several months.

7.0 Procedure

7.1 Cleaning of Equipment: Acid-clean all glassware by soaking in 1:1 HNO_3 for 30 minutes and rinsing with water.

7.2 Collection and shipping of samples

7.2.1 Open both ends of the sample tube and connect to a sampling pump. Collect a sample at a given flow rate for a given time period. A flow rate of 0.2 L/min for 6 hrs is typical.

7.2.2 At the end of the sampling period, remove the tube from the pump, cap both ends, and transport to the laboratory.

7.3 Sample Preparation

7.3.1 Remove the end caps and add the two sections of charcoal to separate 250-ml bottles.

7.3.2 Add to each bottle in succession: 50 ml of water, 5 ml of H_2SO_4, 2.5 ml of HNO_3, 15 ml of $KMnO_4$ solution (6.6), and 8 ml of $K_2S_2O_8$ solution (6.7).

7.3.3 Place the bottles in a water bath at 95°C for 2 hours.

7.3.4 Cool and add 6 ml of sodium chloride-hydroxylamine sulfate solution (6.5) to each bottle to reduce the excess permanganate.

7.3.5 Transfer the contents of each bottle to a 100-ml volumetric flask and dilute to volume.

7.4 Analysis of Sample

7.4.1 Transfer 10 ml of each sample to a 250-ml bottle and dilute to ~100 ml with water.

7.4.2 Add 5 ml of the stannous sulfate suspension to a bottle and immediately attach the bottle to the aeration assembly (Figure 1).

7.4.3 Set the bypass valves to allow the gas (@ 1 liter/min) to sweep the elemental mercury from the bottle to the absorption cell. The absorbance will reach maximum within 30 seconds.

7.4.4 As soon as the absorbance begins to decrease, open the bypass valves and continue the aeration until the recorder returns to baseline.

7.4.5 Repeat 7.4.2 through 7.4.4 for each 10→100 dilution. If the level of mercury is too high in the 10→100 dilution, repeat 7.4.1 through 7.4.4 with a smaller aliquot (diluted to 100 ml) until the mercury level is within the range of the standards. If the 10→100 dilution is too low, repeat 7.4.1 through 7.4.4 with the remaining 90 ml of sample, diluted to ~100 ml (See Note 1).

Note 1

After adding the 5 ml of stannous sulfate suspension to a 90→100 dilution, the bottle must be stoppered and a delay of 10 minutes observed before attaching the bottle to the aeration assembly. This delay is necessary to overcome the effects of interferences which are encountered only in the 90→100 dilution.

Note 2

If a dual-channel spectrophotometer is available, the entire 100-ml sample from 7.3.5 may be processed. (Observe the delay discussed in Note 1.) The scale expansion controls of each channel can be adjusted to record low levels on one channel and high levels on the other channel, thus eliminating the need to make multiple dilutions.

8.0 Calibration and Standards

8.1 Transfer 0, 100, 300, 500, and 1000-μl aliquots of the working mercury solution (6.9) to a series of 250-ml bottles. Note: Reagent blank values should not exceed 0.05 μg.

8.2 Dilute to 100 ml with water and treat as samples beginning with the H_2SO_4 addition in 7.3.2 and ending with 7.3.4.

8.3 Analyze the standards beginning with 7.4.2.

8.4 Plot peak heights versus μg mercury as a calibration curve.

9.0 Calculations

9.1 The total μg mercury found in each charcoal section is found using the following formula:

$$\text{Hg, } \mu g = (A-B) \times \frac{100}{V}$$

where A = Hg found from the calibration curve, μg,

B = Hg found in the reagent blank, μg, and

V = volume of aliquot taken in 7.4, ml.

9.2 The Hg content of each charcoal section is reported separately to allow evaluation of the efficiency of the sampling.

10.0 Reference

10.1 Procedure No. IHA-450, this manual.

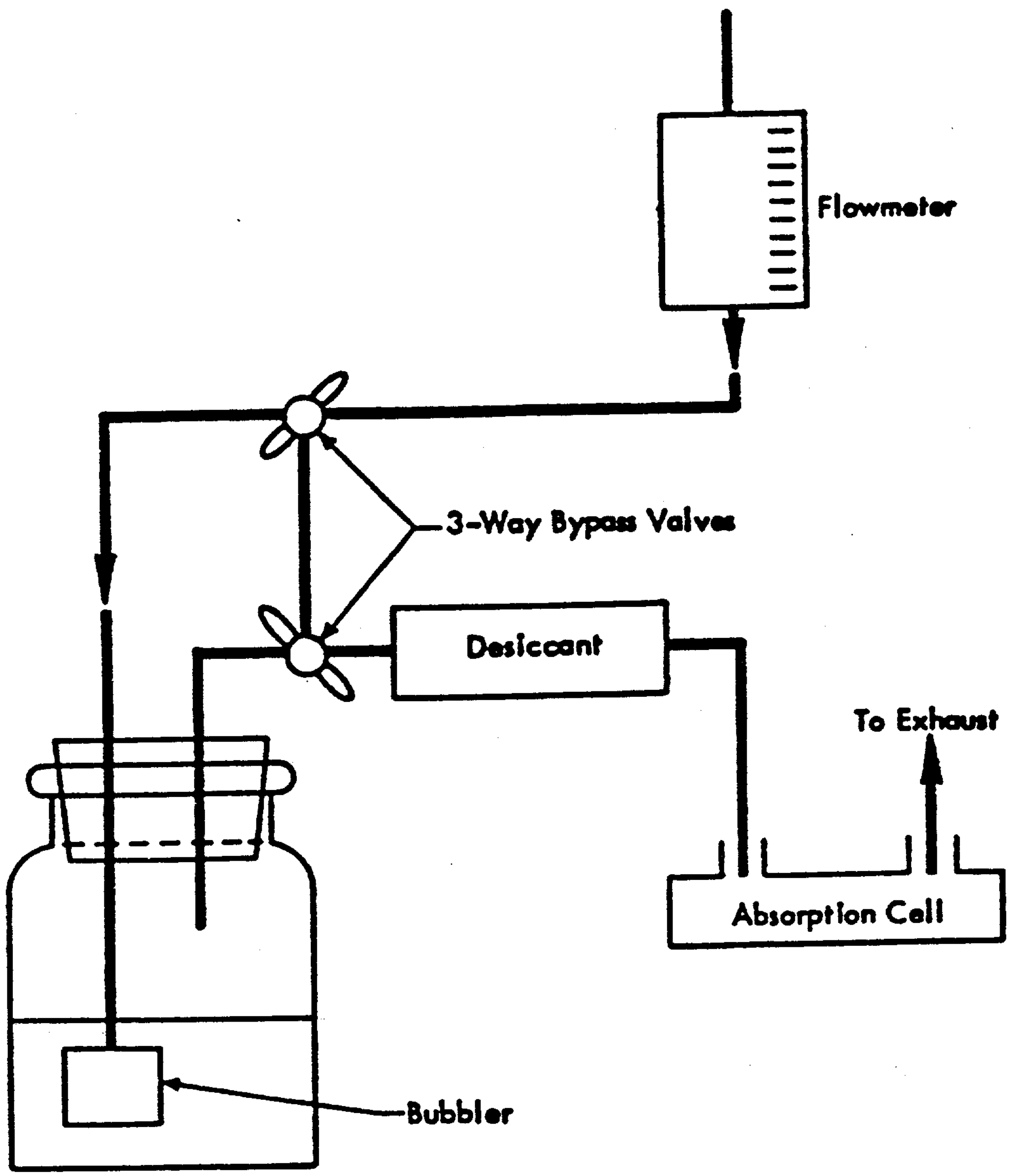

Figure 1. APPARATUS FOR FLAMELESS MERCURY DETERMINATION.

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Requestor: Susan Flack

Document Center (is requested to provide the following document): ERDMC (K-1420)

Date of request: 10/29/96

Expected receipt of document: ASAP

Document number: ERD25307 K/QT-128

Date of document:

Title and author (if document is unnumbered):

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(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received:

Signature:

JULY 1987

K/QT-128

SAMPLING AND ANALYSIS PLAN

K-1420 MERCURY ROOM

OAK RIDGE GASEOUS DIFFUSION PLANT

Prepared by the
Oak Ridge Gaseous Diffusion Plant
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

TABLE OF CONTENTS

SAMPLING PROTOCOL

K-1420 MERCURY RECOVERY ROOM

1. BACKGROUND AND SCOPE

The K-1420 Mercury Recovery Room is located inside the K-1420 Building which is located on the northeast side of the ORGDP Plant. The unit was operated during the 1960s for cleaning used mercury utilizing a distillation process. Presently, the room contains the hoods, distillation equipment, and other associated equipment used in the recovery process. The unit is being evaluated since the remaining equipment is suspected to be contaminated with residual quantities of mercury.

2. SITE PREPARATION

2.1 Any mercury stored in the room will be removed from the site.

2.2 Plastic film will be used over the floor to contain any mercury vapor which might arise from mercury trapped in possible cracks in the floor. The plastic will keep the mercury vapor concentrated, facilitating its collection by reducing the volume of air available for dilution.

3. EQUIPMENT AND SUPPLIES

3.1 Mercury Vapor Monitor

3.2 Mercury Vapor Collection Tubes, Charcoal impregnated with KI and iodine as described in Procedure IHA-150 (Appendix II).

3.3 Pump, Air, Capable of pumping air through the mercury collection tubes at a flow rate of 0.2 liters per minute.

3.4 Flowmeter, For measuring a flow of 0.2 liters per minute.

3.5 Tubing, polyflo, for connecting collection tubes to air pump.

4. SAFETY CONCERNS

4.1 Since the process is no longer in use, the concentration of mercury vapor in the room is expected to be below hazardous concentrations.

4.2 Exposure time to the room air will be kept at a minimum.

4.3 A mercury vapor monitor will be used to survey the room to determine whether hazardous levels of mercury exist in the room atmosphere.

5. SAMPLING RATIONALE

5.1 The process was used for the purification of elemental mercury, thus sampling of the area will be conducted to determine whether elemental mercury is still present in the area. A drawing of the room is given in appendix I. Sampling locations are shown on the drawing.

5.2 Elemental mercury has an appreciable vapor pressure, therefore if it is present, it can be detected by determining the presence of mercury vapor in the atmosphere.

5.3 There are three possible sources of mercury in the room. Each possible source will be sampled for evidence of mercury vapor. The sources are:

5.3.1 Equipment remaining in the room. Air from the equipment will be sampled to determine whether mercury remains in the equipment. Since the equipment represents a closed system, mercury vapor levels will be relatively high if mercury remains in the equipment. Samples will be collected from 5 of the distillation units present.

5.3.2 Drains. There is a possibliity that liquid mercury was spilled into the drain in the sink. A sample of any liquid left in traps in the drain will be collected to determine whether liquid mercury remains in the traps. Samples of air from the drains will also be collected. If mercury is present in pockets in the drains, the concentration of mercury vapor in the drain will be relatively high since there is no air flow for dilution.

5.3.3 Floor. There is a possiblility that mercury was spilled onto the floor during operation of the facility. Any spilled material could subsequently leak into cracks in the floor and collect there. Sampling of the floor area will be for mercury vapor as in the sampling of equipment and drains. Due to the volume of the room, considerable dilution of any vapor present would be expected under normal conditions. To concentrate any vapor arising from the floor, plastic film will be mounted just above floor level in order to concentrate the mercury vapor. Two samples will be collected from the floor area. The floor area will be divided between the two samples. The plastic film will be installed at least one day before sampling the floor area to allow vapors, if present, to concentrate.

5.3.4 A background sample will be taken in a room removed from the mercury recovery room.

6. SAMPLING PROCEDURE

6.1 The procedure used for the analysis of mercury vapor in the air will be IHAP procedure no. IHA-150 MERCURY IN AIR, FLAMELESS AA METHOD. The IHA-150 procedure is given in appendix II.

6.2 For each of the locations identified in 5.3, Set up a sampler consisting of a collection tube connected to a vacuum pump with tygon tubing. Start the pump and adjust flow rate to .2 liters per minute. Allow samples to collect for 24 hours.

6.3 At the end of the sampling period, stop pumps and seal the ends of the sampling tubes. Label each sample with date, time, sample number, and samplers name. A representative sample label is shown in appendix III, figure 1a.

6.4 Record sample date, time, sample number, sampler's name, and location of the sample. The log book used for these records will contain a copy of a map of the area, and a copy of the sampling plan.

7. CHAIN OF CUSTODY

7.1 The chain of custody protocol will follow requirements in SW-846 TEST METHODS FOR EVALUATING SOLID WASTE. Requirements for proper chain of custody are:

1. Seal sample with chain of custody seal on which are recorded sample number, sample date and time, and sampler's signature. A representative sample seal is shown in Appendix III, figure 1b.

2. Fill out chain of custody card. A representative chain of custody card is shown in Appendix III, figure 2.

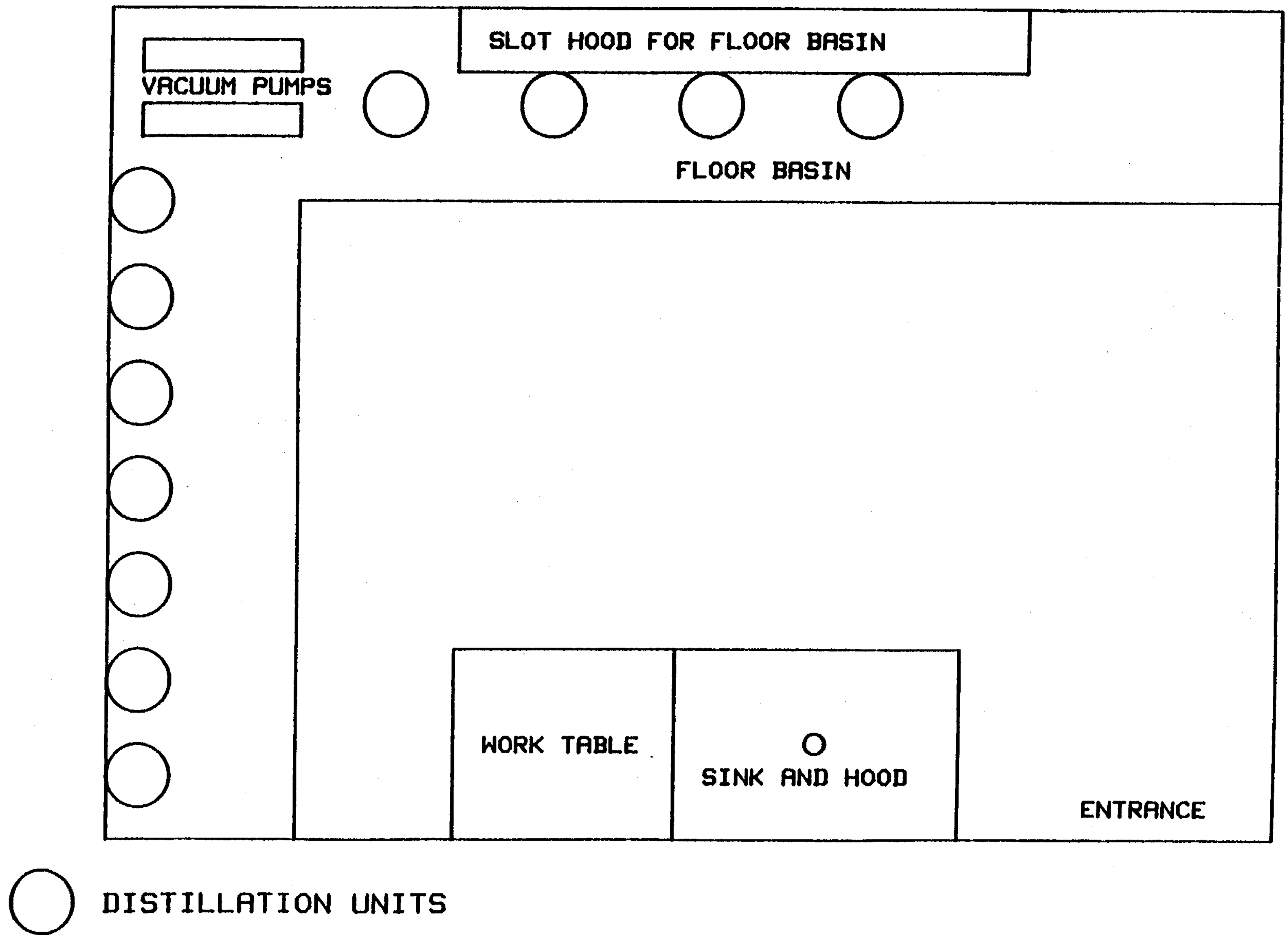
3. When samples are relinquished to the lab, transfer is signed over on the chain of custody cards.

8. ANALYSIS

8.1 Samples will be analyzed for metallic mercury using procedure IHA-150 as shown in appendix II.

8.2 The front and back sections of the tubes will be analyzed separately for the purpose of confirming sufficient collection efficiency if high concentrations of mercury are found.

APPENDIX I



K-1420 MERCURY RECOVERY ROOM

APPENDIX II

INDUSTRIAL HYGIENE ANALYSIS PROCEDURE

UNION CARBIDE CORPORATION
NUCLEAR DIVISION
OAK RIDGE, TENNESSEE - PADUCAH, KENTUCKY

NUMBER	IHA-150
DATE	Nov. 27, 1979
SUPERSEDES	
PAGE	1 OF 6

MERCURY IN AIR, FLAMELESS AA METHOD

Analyte:	Mercury	Method No.:	IHA-150
Matrix:	Air	Range:	0.05 - 1.0 total μg
Procedure:	Adsorption on treated charcoal, acid desorption, digestion; measured by flameless atomic absorption	Precision:	∿5% RSD (estimated, not evaluated)
		Bias:	-3%

1.0 Principle of the Method

1.1 Air is drawn through a sampling tube containing activated charcoal impregnated with iodine and potassium iodide. The flow rate and sampling time are chosen to provide a representative workplace air sample.

1.2 The charcoal is digested in an acid-permanganate-persulfate solution at 95°C for 2 hours. Elemental mercury is then liberated by reduction with $SnSO_4$, and measured by flameless atomic absorption.

1.3 All forms of mercury--elemental, inorganic, organic--are determined by this method.

2.0 Range and Sensitivity

2.1 The normal working range is up to 1.0 μg of mercury. The lowest concentration reported is 0.05 μg.

2.2 Provision is made for extending the range to 10 μg.

3.0 Interferences

3.1 Organic compounds interfere by absorption at the 253.7 nm wavelength. This interference is minimized by the digestion step.

4.0 Precision and Accuracy

4.1 No precision studies have been made; however, specific amounts of mercury vapor were loaded on sampling tubes and analyzed by this method with the following results:

APPROVED BY Y-12	LAB	A. J. McElhaney	APPROVED BY ORGDP	LAB	T. Kwasnoski	APPROVED BY UCCND-COORD'R: C W Weber
	IH	W. S. Everett, Jr.		IH	R. J. Duncan	
APPROVED BY PGDP	LAB	R. E. Simmons	APPROVED BY ORNL	LAB	W R Laing	NUMBER
	IH	C. W. Turok		IH	J. A. Early	IHA-150

µg Hg added	µg Hg found	Recovery, %
50	50.9	101.8
40	35.8	89.5
30	26.9	89.7
5	4.7	94.0
4	4.0	100.0
3	3.2	106.7

The average recovery was 97%.

5.0 Apparatus

5.1 Atomic absorption spectrophotometer, with an absorption cell at least 10-cm long x 2-cm I.D. with quartz endwindows.

5.2 Mercury hollow cathode lamp.

5.3 Strip-chart recorder.

5.4 Reagent bottles, 250-ml.

5.5 Gas supply: air, N_2, or argon.

5.6 Flowmeter, to deliver gas at 1 liter per minute.

5.7 Aerating tube: fitted with a straight cylindrical flat-end glass frit of coarse porosity.

5.8 Drying tube: a 15-cm x 19-mm O.D. tube packed with magnesium perchlorate desiccant. The apparatus is assembled as shown in Figure 1.

5.9 Water bath, capable of maintaining 95 ± 2°C.

5.10 Charcoal tubes: glass tube with both ends flame-sealed, 7 cm long with 6-mm O.D. and 4-mm I.D., containing 2 sections of 20/40 mesh activated charcoal separated by a 2-mm portion of urethane foam. The activated charcoal is prepared from coconut shells and is fired at 600°C and impregnated with 0.3% I_2 and 0.6% KI prior to packing. The absorbing section contains 100 mg of charcoal, the backup section 50 mg. A 3-mm portion of urethane foam is placed between the outlet end of the tube and the backup section.

These tubes, as described, are commercially available.

6.0 Reagents

All reagents are reagent grade and water is double-distilled or deionized.

6.1 Sulfuric acid, conc.

6.2 Sulfuric acid, 0.5 N: Add 14.0 ml of conc sulfuric acid to about 900 ml of water and dilute to 1 liter.

6.3 Nitric acid, conc: Reagent grade of low mercury content. TRANSISTAR grade (Mallinckrodt) is suitable. If this grade is not used, and a reagent blank of >0.05 µg is obtained, it will be necessary to distill the nitric acid.

6.4 Stannous sulfate suspension: Add 25 g of stannous sulfate to 250 ml of 0.5 N sulfuric acid. This mixture should be stirred continuously during use. (Stannous chloride may be used in place of stannous sulfate.)

6.5 Sodium chloride-hydroxylamine sulfate solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in water and dilute to 100 ml. (Hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate.)

6.6 Potassium permanganate, 5% solution (W/V): Dissolve 5 g of potassium permanganate in 100 ml of water.

6.7 Potassium persulfate, 5% solution (W/V): Dissolve 5 g of potassium persulfate in 100 ml of water.

6.8 Stock mercury solution: Dissolve 0.1354 g of mercuric chloride in 75 ml of water, add 10 ml of conc nitric acid, and dilute to 100 ml. 1 ml = 1 mg Hg.

6.9 Working mercury solution: Add 1 ml of the stock mercury solution to 1.5 ml of conc nitric acid and dilute to 1000 ml with water. 1 ml = 1 µg Hg. This solution is stable for several months.

7.0 Procedure

7.1 Cleaning of Equipment: Acid-clean all glassware by soaking in 1:1 HNO_3 for 30 minutes and rinsing with water.

7.2 Collection and shipping of samples

7.2.1 Open both ends of the sample tube and connect to a sampling pump. Collect a sample at a given flow rate for a given time period. A flow rate of 0.2 L/min for 6 hrs is typical.

7.2.2 At the end of the sampling period, remove the tube from the pump, cap both ends, and transport to the laboratory.

7.3 Sample Preparation

7.3.1 Remove the end caps and add the two sections of charcoal to separate 250-ml bottles.

7.3.2 Add to each bottle in succession: 50 ml of water, 5 ml of H_2SO_4, 2.5 ml of HNO_3, 15 ml of $KMnO_4$ solution (6.6), and 8 ml of $K_2S_2O_8$ solution (6.7).

7.3.3 Place the bottles in a water bath at 95°C for 2 hours.

7.3.4 Cool and add 6 ml of sodium chloride-hydroxylamine sulfate solution (6.5) to each bottle to reduce the excess permanganate.

7.3.5 Transfer the contents of each bottle to a 100-ml volumetric flask and dilute to volume.

7.4 Analysis of Sample

7.4.1 Transfer 10 ml of each sample to a 250-ml bottle and dilute to ∿100 ml with water.

7.4.2 Add 5 ml of the stannous sulfate suspension to a bottle and immediately attach the bottle to the aeration assembly (Figure 1).

7.4.3 Set the bypass valves to allow the gas (@ 1 liter/min) to sweep the elemental mercury from the bottle to the absorption cell. The absorbance will reach maximum within 30 seconds.

7.4.4 As soon as the absorbance begins to decrease, open the bypass valves and continue the aeration until the recorder returns to baseline.

7.4.5 Repeat 7.4.2 through 7.4.4 for each 10→100 dilution. If the level of mercury is too high in the 10→100 dilution, repeat 7.4.1 through 7.4.4 with a smaller aliquot (diluted to 100 ml) until the mercury level is within the range of the standards. If the 10→100 dilution is too low, repeat 7.4.1 through 7.4.4 with the remaining 90 ml of sample, diluted to ∿100 ml (See Note 1).

<u>Note 1</u>

After adding the 5 ml of stannous sulfate suspension to a 90→100 dilution, the bottle must be stoppered and a delay of 10 minutes observed before attaching the bottle to the aeration assembly. This delay is necessary to overcome the effects of interferences which are encountered only in the 90→100 dilution.

Note 2

If a dual-channel spectrophotometer is available, the entire 100-ml sample from 7.3.5 may be processed. (Observe the delay discussed in Note 1.) The scale expansion controls of each channel can be adjusted to record low levels on one channel and high levels on the other channel, thus eliminating the need to make multiple dilutions.

8.0 Calibration and Standards

8.1 Transfer 0, 100, 300, 500, and 1000-μl aliquots of the working mercury solution (6.9) to a series of 250-ml bottles. Note: Reagent blank values should not exceed 0.05 μg.

8.2 Dilute to 100 ml with water and treat as samples beginning with the H_2SO_4 addition in 7.3.2 and ending with 7.3.4.

8.3 Analyze the standards beginning with 7.4.2.

8.4 Plot peak heights versus μg mercury as a calibration curve.

9.0 Calculations

9.1 The total μg mercury found in each charcoal section is found using the following formula:

$$\text{Hg, } \mu g = (A-B) \times \frac{100}{V}.$$

where A = Hg found from the calibration curve, μg,

B = Hg found in the reagent blank, μg, and

V = volume of aliquot taken in 7.4, ml.

9.2 The Hg content of each charcoal section is reported separately to allow evaluation of the efficiency of the sampling.

10.0 Reference

10.1 Procedure No. IHA-450, this manual.

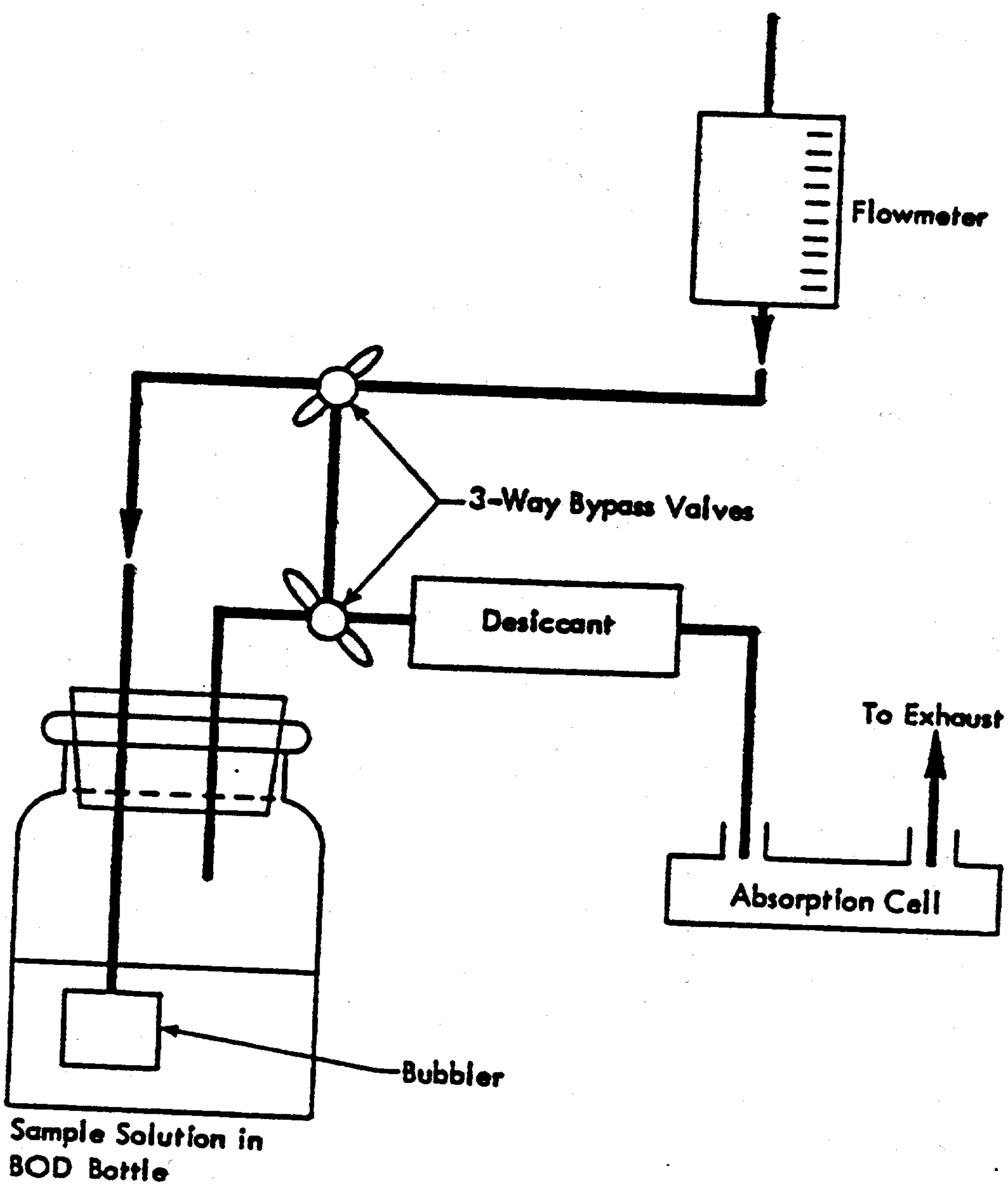


Figure 1. APPARATUS FOR FLAMELESS MERCURY DETERMINATION.

APPENDIX III

OAK RIDGE GASEOUS DIFFUSION PLANT

ANALYTICAL LABORATORY SAMPLE LABEL

Collector ______________________ **Customer Sample No.** ____________

Place of Collection ____

____

Date Sampled ______________________ **Time Sampled** ____________ ☐ AM ☐ PM

Field Information (Sample collection method, etc.) ____________________

____

____

AnaLIS ID Number ______________________________

(Lab Use Only)

UCN-18826 (1 11-84)

Figure 1a REPRESENTATIVE SAMPLE LABEL

ORGDP Analytical Laboratory Sample Seal

COLLECTOR ______________________
(Signature)

CUSTOMER SAMPLE NO. ____________

DATE COLLECTED ____________ ☐ AM

TIME COLLECTED ____________ ☐ PM

PLACE COLLECTED ____________________

____

UCN-18827 (1 11-84)

Figure 1b REPRESENTATIVE SAMPLE SEAL

ORGDP CHAIN OF CUSTODY FORM

SAMPLER: (Signature)			Dept.		Building/Phone		SAMPLE TYPE						REMARKS
CUSTOMER SAMPLER NUMBER	Sampling Date	Sampling Time	COMP	GRAB	SAMPLE LOCATION	TOTAL NO. OF CON-TAINERS	Water	Oil	Soil	Solvent	Sludge	Other	

UCN-15487A (1 11-84) Signatures Required on Back

Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone
Relinquished By: (Signature)	Date / Time	Received By: (Signature)	Date / Time	Dept.	Building	Phone

REMARKS.

RETURN TO ENVIRONMENTAL ANALYSIS, K-1004B, MS-443, 4-8701

Figure 2 REPRESENTATIVE CHAIN OF CUSTODY CARD

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: MCCALL/ZINGG
Customer Sample Number: HG BLANK
Date Sample Received: 02-OCT-1986
Material Description: CHARCOAL TUBES

Lab Sample Number: 861002-090
Date Sample Completed: 17-OCT-1986
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DW Frazier
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-1
Lab Sample Number: 860930-060
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	1666	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-2
Lab Sample Number: 860930-061
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	2246	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	120	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-3
Lab Sample Number: 860930-062
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	29	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-4
Lab Sample Number: 860930-063
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	1060	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	4	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-5 Lab Sample Number: 860930-064
Date Sample Received: 30-SEP-1986 Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	42	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-6
Lab Sample Number: 860930-065
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	555	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-7
Lab Sample Number: 860930-066
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	83	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-8 Lab Sample Number: 860930-067
Date Sample Received: 30-SEP-1986 Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	164	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-9
Lab Sample Number: 860930-066
Date Sample Received: 30-SEP-1986
Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES
Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

Customer Name: ZINGG/MCCALL
Customer Sample Number: HG-10 Lab Sample Number: 860930-069
Date Sample Received: 30-SEP-1986 Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES Req. Number:

Act. No.	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	Date Completed
1010		IHA-150	Mercury	182	ug	CD SCHAEFER	17-OCT-1986
		IHA-150	Mercury	<1	ug	CD SCHAEFER	17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-060 Project: K121 Customer Sample ID: HG-1
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	1666	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-061 Project: K121 Customer Sample ID: HG-2
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	2246	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	120	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-062 Project: K121 Customer Sample ID: HG-3
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	29	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant

Analytical Chemistry Department

Results of Analyses

AnaLIS ID: 860930-063 Project: K121 Customer Sample ID: HG-4

Customer: ZINGG/MCCALL Requisition Number:

Date Sampled: Date Sample Received:

Sampled By: Date Sample Completed: 17-OCT-1986

Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	1060	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	4	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg

Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-064   Project: K121   Customer Sample ID: HG-5
Customer: ZINGG/MCCALL   Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	42	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-065 Project: K121 Customer Sample ID: HG-6
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	555	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant

Analytical Chemistry Department

Results of Analyses

AnaLIS ID: 860930-066 Project: K121 Customer Sample ID: HG-7

Customer: ZINGG/MCCALL Requisition Number:

Date Sampled: Date Sample Received:

Sampled By: Date Sample Completed: 17-OCT-1986

Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	83	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg

Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-067   Project: K121   Customer Sample ID: HG-8
Customer: ZINGG/MCCALL   Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	164	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-068 Project: K121 Customer Sample ID: HG-9
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 860930-069 Project: K121 Customer Sample ID: HG-10
Customer: ZINGG/MCCALL Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	182	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

Oak Ridge Gaseous Diffusion Plant
Analytical Chemistry Department
Results of Analyses

AnaLIS ID: 861002-090 Project: K121 Customer Sample ID: HG BLANK
Customer: MCCALL/ZINGG Requisition Number:
Date Sampled: Date Sample Received:
Sampled By: Date Sample Completed: 17-OCT-1986
Material Description: CHARCOAL TUBES

Activ. Number	Preparation Procedure No.	Analysis Procedure No.	Analysis	Result	Units	Analyst	QA File Number	Date Completed
1010		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986
		IHA-150	Mercury	<1	ug	C. SCHAEFER		17-OCT-1986

Program Manager: DS Zingg
Date Approved: 17-OCT-1986

2239

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[redacted]

K-1420 Air Analyses, 1955-57

Compiled by

S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

July 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7301
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 51
Routine X
Special
Requested by
Date 3-19-57

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1401	2-21-57	Tool Room				
		USA CRCCO #223930 Mer-Vac. cleaner 6 In. from exhaust	1300-	Mercury	0.86mg/m³.	Non-environmental
		1 Ft. from exhaust			0.60mg/m³	
		1 Ft. 6 in. from exhaust			0.40mg/m³	
		2 Ft. from exhaust	-1320		0.20mg/m³	
		• This cleaner should be cleaned and recharged.				

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C. Y. Stoddard

2237

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K-1420 AIR ANALYSES 1958-1959

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July 1995

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 3.7
Routine
Special X
Requested by R. J. Clouse
Date [illegible]

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
Vehicle No. E-7273	9-23-58	Inside truck cab	1430	Mercury	0.30mg/m3	Outside K-1420. Windows had been closed on truck.
			1450		0.10mg/m3	Windows had been opened and truck aired out before second sample was taken.
			1455		0.20mg/m3	Sample taken after windows had been closed just after sample No. 2 was completed.

129

Misc 3

WCX-2512(9-55) K-25 RC Medical Department

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AIR SAMPLING REPORT

Routine
Special
Requested by
Date [illegible]

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1120	10-17-58	P Area				
		Mercury recovery room				
		By washing sink	1550	Mercury	0.00mg/m³	Mercury being washed in sink.
		By storage table	1552		0.00mg/m³	
		By stills	1555		0.00mg/m³	Layer of water over Mercury in trough under stills. Stills not in operation. Exhaust system off.*
		*The exhaust system should be interconnected with the light system in order to prevent entry into this area when the ventilation is not operating.				
	10-22-58	B Area				
		By calciner platform	0900 - 0930	Uranium Hydrogen Fluoride	<0.01mg/m³ <0.1 ppm	Three calciners in operation.
			0930 - 1000		<0.01mg/m³ <0.1 ppm	" "
			1000 - 1030		0.01mg/m³ 0.1 ppm	" "

126

WCX-2512(9-55) K-25 RC Medical Department

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AIR SAMPLING REPORT

Special
Requested by
Date [illegible]

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1420	11-30-58	C Area Southeast corner of convertor disassembly platform	2100 - 2130	Uranium Hydrogen Fluoride	0.01mg/m^3 <0.1 ppm	
			2130 - 2200		0.10mg/m^3 0.3 ppm	
			2200 - 2230		0.03mg/m^3 0.1 ppm	
		Northeast corner of floor pan	2100 - 2130		0.01mg/m^3 <0.1 ppm	
			2130 - 2200		0.03mg/m^3 <0.1 ppm	Employee, without respirator, was cleaning equipment.
			2200 - 2230		0.04mg/m^3 <0.1 ppm	
	12-9-58	F Area Mercury Recovery Room West end	1530	Mercury	0.00mg/m^3	Exhaust system on. Four mercury stills in operation.
		East end	1535		0.00mg/m^3	
		By washing table	1540		0.00mg/m^3	

120

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[illegible] K-25 or Medical Department

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

Routine
Special
Requested by
Date

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1420	1-21-59	F Area Mercury Recovery Room By mercury stills	1530	Mercury	0.00mg/m^3	No stills in operation.
			1535		0.00mg/m^3	All mercury droplets in sink were covered with a layer of water.

94

Hy 2-1

WCX-2512 (9-55) K-25 RC Medical Department

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J. Dykstra
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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER
Routine
Special
Requested by
Date 3-1[illegible]-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
[illegible]-1420	3-18-59	F Area Mercury Recovery Room	1515	Mercury	0.00mg/m3	No stills in operation.

76

Hg 1-1

A 4 1400. 1

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 145
Routine X
Special
Requested by
Date 4-15-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
E-1420	4/7/59	F Area Mercury recovery room	1315	Mercury	0.00 mg/m3	No stills in operation No mercury being washed

74

Hg

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AIR SAMPLING REPORT

NUMBER 270 Page 4
Routine X
Special
Requested by
Date 6-16-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1420	6-2-59	C Area West of scrap saw platform				Saw not in operation.
57		F Area Mercury recovery room By stills	1510	Mercury	0.02mg/m3	Three stills in operation.
		By washing sink	1515		0.00mg/m3	Mercury in bottles being washed.
		Center of room	1520		0.00mg/m3	

D. L. Stallard

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A. Varlan
[illegible]
File

AIR [illegible]

Date [illegible]

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
[illegible]	1-7-52	F Area Mercury Recovery Room by washing sink	1455	Mercury	0.10mg/m3	Mercury being washed.
		Cabinet under washing sink	1457		0.12mg/m3*	Instrument reading was higher at the moment the door was opened.
		West side of washing sink	1459		0.05mg/m3	Bottle of Mercury on shelf of cabinet.
		Cabinet under storage area	1505		0.12mg/m3*	
		Southeast corner of room	1510		0.0[illegible]mg/m3	Bottles of Mercury stored on floor.
		By Mercury stills	1515		0.[illegible]mg/m3	Stills not in operation.

* Miscellaneous - Non-environmental

44

Hg 3

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 307
Routine X
Special
Requested by
Date

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1420	8-12-59	Mercury Recovery Room Middle	1455	Mercury	0.02mg/m3	
		By washing sink			0.04mg/m3	Mercury being washed.
		Southeast corner			0.06mg/m3	Considerable amount of Mercury stored in bottles.
		Cabinet under sink			0.22mg/m3	
		By cabinet shelves			0.21mg/m3	
		By Mercury stills			0.09mg/m3	Stills in operation.
		Storage table			0.02mg/m3	
		At hood intake - behind still rack	1515	Air Velocity		
		Center of hood			250fpm	
		Left and right end of hood			180fpm	

34

Hg 5-
Misc 2

WCX-2512(9-55) K-25 RC Medical Department

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 459
Routine X
Special
Requested by
Date 10-.-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
[illegible]-1[illegible]	9-21-59	F Area Mercury Recovery Room Above washing table	1540 -	Mercury	0.00mg/m^3	
		Southeast corner			0.00mg/m^3	
		Under sink			0.04mg/m^3	
		Table, west of sink			0.0[illegible]mg/m^3	
		Under table west of sink			0.03mg/m^3	
		Metal waste can			0.[illegible]mg/m^3	
		By mercury stills	- 1605		0.00mg/m^3	No stills in operation

32

Hg 6-

[illegible]

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AIR SAMPLING REPORT

NUMBER 468 Page 6
Routine X
Special
Requested by
Date 10-15-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
		F Area				
K-1420	10-7-59	Mercury recovery room By washing table	1435	Mercury	0.04mg/m3	
		Southeast corner	1437		0.10mg/m3	
		Under washing sink	1439		0.09mg/m3	
		Under right side of sink	1443		0.08mg/m3	
		By Mercury stills	1455		0.02mg/m3	Exhaust system on. 4 stills in operation.
		Storage table, North end	1500		0.02mg/m3	

26

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INDUSTRIAL HYGIENE
AIR SAMPLING REPORT

NUMBER 580 Page 1
Routine X
Special
Requested by
Date 12-17-59

BUILDING OR AREA	DATE	SAMPLING LOCATION	SAMPLING TIME	CONTAMINANT	RESULT	OBSERVATIONS AND REMARKS
K-1420	12-3-59	Northeast corner of floor pan	1100 - 1130	Uranium Hydrogen Fluoride	< 0.01 mg/m3 0.1 ppm	
			1130 - 1200		< 0.01 mg/m3 0.1 ppm	
		South side of acid spray booth	1515	Nitrogen Dioxide	0ppm	Equipment was being sprayed at this time.
	12-10-59	Mercury Recovery Room Center of room	1018	Mercury	0.08mg/m3	
		By sink	1019		0.01 mg/m3	
		Table top	1020		0.01 mg/m3	
		Cabinet under table	1022		0.02 mg/m3	One door missing.
						Droplets of Mercury on floor along east wall and on table against north wall.

ISSUED BY: D. L. Stoddard

12

Box# 12-2-5-27

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

Jennifer Lamb / K-25 Site Record

Requestor — Document Center (is requested to provide the following document)

Date of request 3/22/95 Expected receipt of document 4/7/95

Document number ______ Date of document 1960-1963

Title and author (if document is unnumbered)

K-1420 Air Analyses 1960-1963

Please copy the entire folder

(This section to be completed by Document Center)

Date request received 3/27/95

Date submitted to ADC 4/3/95

Date submitted to HSA Coordinator 3/27/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 4/3/95 6/8/95

Date received from CICO 5/9/95 7/10/95

Date submitted to ChemRisk/Shonka and DOE 7/17/95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received ______

Signature ______

ChemRisk Document No. 2104

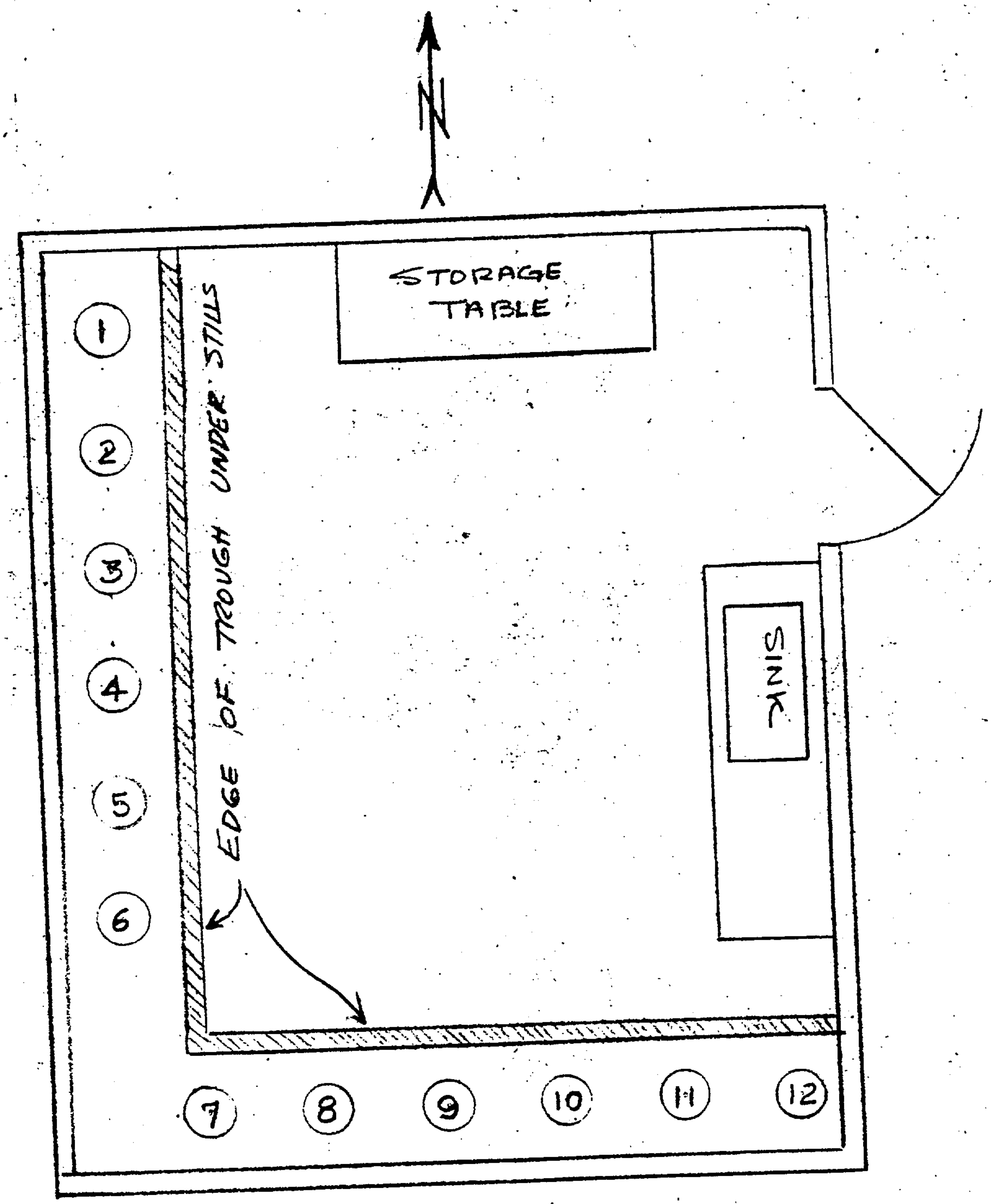
Sanitized Version of Folder of
K-1420 AIR ANALYSES 1960

Compiled by

S. G. Thornton
Environmental Management Division
OAK RIDGE K-25 SITE
for the Health Studies Agreement

July 1995

Oak Ridge K-25 Site
Oak Ridge, Tennessee 37831-7301
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the U.S. DEPARTMENT OF ENERGY
under Contract DE-AC05-84OR21400



102-B
MERCURY RECOVERY ROOM
K-1420

MERCURY USAGE AT THE ORGDP
1968 THROUGH 1ST QUARTER 1970

There was no mercury purchased during this period. The ORGDP has sufficient mercury in stock to meet its requirements. Used (dirty or contaminated) mercury is reclaimed through a controlled recovery process (triple distillation) and reissued as requested.

The ORGDP was contracted to recover approximately 1000 pounds of mercury from mercury batteries by a private company during the period.

The following table shows the mercury used and processed by the ORGDP during this period:

Code*	Quantity/lb.	1968 Month-Day	Account
12	8	1-17	1340
12	8	1-17	1340
12	80	1-24	2647 (Y-12)
12	48	2-5	1571
07	32	2-8	M.T.
12	8	2-9	1340
01	0	2-13	1582
12	80	2-20	2647 (Y-12)
12	8	2-23	1340
12	48	3-4	1572
12	48	3-15	1572
12	32	3-19	1272
12	40	3-25	1340
	No Record for April, 1968		
12	17	5-3	1572
12	8	5-7	1730
12	8	5-8	1239
12	48	5-13	1572
12	64	5-14	1572
12	8	5-16	1340
12	110	5-22	2648 (Y-12)
12	8	6-4	1340
12	48	6-6	2647 (Y-12)
12	16	6-10	1340
12	96	6-17	1340
12	8	6-21	1340
12	40	6-21	1572
12	16	6-25	1340
12	48	6-26	2647 (Y-12)
12	48	7-1	1572
12	57	7-8	2378 (Y-12)
12	32	7-15	1340
12	64	7-17	1572
25	102	--- Inventory --	
12	48	7-24	2378 (Y-12)
06	200	7-26	1566
07	48	8-1	M.T.
06	304	8-7	1565
12	80	8-12	2378 (Y-12)
01	205	8-15	1582

Rep. No. 1135

Code*	Quantity/lb.	1968 Month-Day	Account
12	64	9-30	1572
01	187	9-15	1582
01	392	9-9	1582
01	480	9-10	1582
12	8	9-18	1340
12	8	10-27	1340
12	8	10-23	1015
12	8	10-25	1015
12	8	11-8	1075
01	936	11-8	---
01	216	12-11	---
07	192	12-11	M.T.
12	40	12-13	1323
12	32	12-17	1726
12	8	12-20	1075

Code*	Quantity/lb.	1969 Month-Day	Account
12	64	1-3	1324
12	16	1-3	1075
01	0	1-10	---
12	48	1-10	1323
12	8	1-14	1075
12	16	1-23	1075
12	64	2-11	1325
12	48	2-13	1323
12	16	3-10	1075
01	0	3-12	---
12	48	3-19	1075
07	40	3-21	M.T.
12	32	4-28	1075
12	32	5-1	1075
12	48	6-10	1323
12	64	6-16	1324
12	48	6-18	1325
01	0	7-15	---
12	8	7-29	1015
12	8	8-8	1075
06	8	8-8	---
01	255	---	---
12	8	9-3	1340
12	8	9-4	1075
01	0	9-15	---
12	5	9-18	1015
12	64	9-24	1324
12	5	10-6	1077
12	10	10-16	1015
12	8	10-22	1075
12	15	10-30	1015
12	10	11-11	1015
12	48	11-11	1323

Code*	Quantity/lb.	1969 Month-Day	Account
12	10	11-14	1325
12	60	11-17	1324
12	8	11-18	1075
01	0	11-19	---
12	32	11-21	1075
12	10	11-24	1015
12	10	12-4	1015
01	0	12-10	---
12	10	12-11	1025

Code*	Quantity/lb.	1970 Month-Day	Account
12	5	1-14	1075
12	8	1-14	1075
24	0 -Inventory January 15, 1970		
25	0 -Inventory January 20, 1970		
12	64	1-26	1325
12	8	1-29	1075
12	8	2-9	1340
12	8	2-13	1002
12	8	2-20	1015
12	8	3-6	1075
01	260	3-12	---

Total 6327

*Code:

01 - Mercury received for processing
06 - Transfer - miscellaneous service and materials
07 - Material transferred to Paducah
12 - Issue of reclaimed mercury

Herb
11/25/70

Repository Document #1130
(303)939-8318

DRAFT

September 17, 1985

L. W. Long

Chemical Release Inventories

As requested in your letter of August 28, 1985, the following describes the status of our efforts to obtain toxic chemical release inventories for five major chemicals utilized at the ORGDP. These chemicals are PCBs, HF, Trichloroethane, Chromium, and Mercury. A preliminary study revealed that reliable information is unavailable for the years prior to 1979 for development of a mass balance. A meeting with Joe Sherrod, Purchasing; and Glenn Brooks, Shipping and Receiving; revealed that routine procurement item files are not retained by either the Purchasing Department or the Shipping and Receiving Department for more than six years. The six-year retention period is designated by DOE Chapter Manual 1324.2, Attachment IV-1, and is repeated in Martin Marietta Energy Systems Accounting Manual Procedure No. 18.11, Listing 4.1. For purchases under $10,000 the retention period is only three years. Thus, to develop a mass balance on the five chemicals beginning in 1945 seems impossible. Information obtained during the preliminary study that is specific to each chemical follows: K-25

1. PCBs — Al Whittaker talked to Clyde Matthews and reviewed Power Operations Records, Power Maintenance Records, and spent two hours in Plant Records scanning files for additional information. The only information of substance regarding PCB inventories is Document K/HS-73, entitled PCB Inventory 1978-1984. This document published by the Environmental Management Department, on May 21, 1985, indicates the PCB inventories on hand in each of the calendar years beginning in 1978 and ending in 1984. Except for some land farming of oils containing PCBs, to our knowledge no PCBs were shipped to other sites or disposed of before the 1978 report; however, there are no records to verify this information. No records exist determining the total quantities of PCBs that were received at the ORGDP since 1945.

2. HF — To attempt a material balance on this chemical would be very complicated. This chemical was received for use in the Fluorine Production Process, for development activities, for packaging and shipment to other sites, and for other uses. An extensive search through logbooks in Plant Records might reveal a portion of the mass balance through old production logbooks; however, a reliable and a complete mass balance seems impossible.

3. Trichloroethane — Joe Sherrod indicated that a fairly extensive manpower effort might be required to search Purchasing Records; however, six years of receiving information might be obtained on this chemical. A mass balance might then be developed by documenting certain assumptions for the last six years.

APPROVAL FOR RELEASE

Document: # Unnumbered ; Date 9/17/85 and revised 2/17/93

Title/Subject 2-page ltr., JG Rogers to LW Long, "Chemical Release Inventories"

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

[signature] 2/18/93

K-25 Classification & Information Control Officer Date

DRAFT

4. Chromium — Work is continuing by Joe Haymore to "scope out" the situation regarding chromium. In recent years this chemical was received at the ORGDP under the trade name OROCOL or Betz 10K. This chemical can enter the environment through the K-901-A Pond Sludge, the Cooling Tower Basin Sludge, Cooling Tower Drift, or through leaks in the RCW System. Some estimates might be made regarding the quantities of chromium entering the environment if certain assumptions are made; however, the data may not be reliable.

5. Mercury — On June 10, 1983, Mike Mitchell transmitted some information to Tom Scott at DOE for a press release regarding the mercury balance at the ORGDP. Mike Mitchell developed the information by using sampling data at effluent points and flow measuring information at the same locations. He calculated that 265 lb of mercury was discharged from all liquid effluent locations from 1971 through 1982. by assuming similar activities and similar release rates for the period from 1948 to 1971, Mike calculated that an additional 600 lb entered surface streams past effluent points during this period. Mike also estimated that approximately 600 lb of mercury was released because of mercury bottle washings at the ORGDP. He added the three numbers and stated that a total of approximately 1,465 lb of mercury was released from the ORGDP from 1948 through 1982.

Only minimal information is available to allow reporting of chemical emissions from the ORGDP. If we must report past information, I suggest looking at laboratory sampling data from the air emission points and the water NPDES locations, along with flow measurements at these locations, and calculate as Mike Mitchell did for mercury, chemical releases to the environment. I do not think this data would be accurate if extended beyond the years for which laboratory sampling data were available. A review of all shift superintendent daily logbooks would be one method of compiling past recorded release information. Quantities may not be recorded, but the incident dates could be defined. We believe these logbooks are available from Plant Records. I estimate that one or two work-years may be required to review 40 years of logbooks and to compile the information. In addition to logbook reviews, waste disposal records could be utilized to supplement the compiled information. In conclusion, considerable manpower will be required to accurately report this information for more than approximately three years. I suggest that we reevaluate the need for such a report. Please let me know your thoughts.

J. G. Rogers, K-303-7, MS 338 (4-8982)

JGR:shh

cc: M. L. Ambrose
W. R. Golliher
File — JGR

*For classification purposes, draft letter was retyped on February 17, 1993, (a few words were removed from the original draft letter dated September 17, 1985). Any questions should be directed to J. G. Rogers or A. S. Quist.

7U U7U 1 2/File
3-f-3

UNION CARBIDE

UNION CARBIDE CORPORATION

NUCLEAR DIVISION

P. O. BOX P, OAK RIDGE, TENNESSEE 37830 1982 DEC -9 AM 11: 57

December 7, 1982

Department of Energy
Oak Ridge Operations
Attention: Mr. J. F. Wing, Chief
Environmental Protection Branch
Post Office Box E
Oak Ridge, Tennessee 37830

(40ppt)
L.O.D. 1ppt .04 ppm MAX
April 1975
(1971-82)

Gentlemen:

FOI Request, Mercury Emissions

In response to your request of November 30, 1982, enclosed is a summary of all data pertaining to concentrations of mercury in ORGDP liquid effluents. Also enclosed is a plant area map depicting the locations of these effluents and their respective points of discharge.

There are no recorded data for any discharges of mercury from the ORGDP into areas that could affect groundwater.

Please let me know if we can be of further assistance in this matter.

Sincerely,

R A Perry for

M. E. Mitchell, Environmental Coordinator
Oak Ridge Gaseous Diffusion Plant

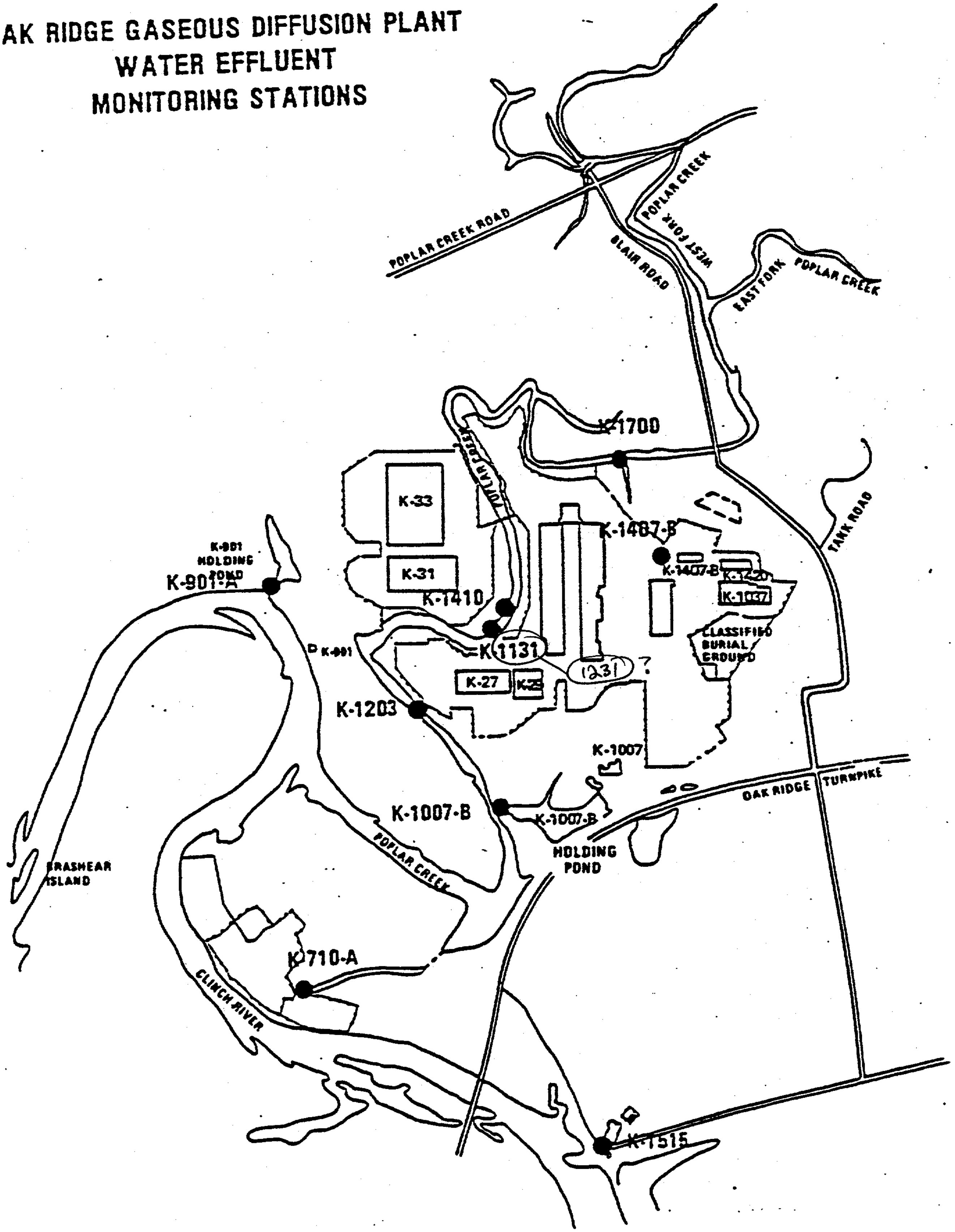
MEM:lc

Enclosure: As Stated

cc: W. F. Thomas, ORGDP

cc/enc: R. G. Jordan, Y-12
File - MEM - NoRC

OAK RIDGE GASEOUS DIFFUSION PLANT WATER EFFLUENT MONITORING STATIONS



Sampling Station	Description
K-1407-B	Settling Pond for Waste Generated at the K-1420 Decontamination Facility
K-1203	600,000 GPD Activated Sludge-Extended Aeration Industrial Sewage Treatment Facility
K-1007-B	Holding Pond for Trace Quantities of Laboratory Waste
K-901-A	Holding Pond for Sludge Generated from the Recirculating Water System Used at ORGDP
K-1700	Discharge Water from Several Storm Drains and the Effluent from K-1407-B Holding Pond
K-710	A Small Sewage Treatment Plant Located at the Powerhouse Area. This Facility Was Taken Out of Operation in March of 1981
K-1515	Holding Pond Which Receives Sludge from the Sanitary Water Treatment Plant
K-1410	Nickel Plating Facility Which Was Taken Out of Operation in 1980
K-1231	Discharge Waste from a Classified Area--This Discharge Point Was Discontinued in 1974

TAB:lc
12-7-82

Mercury Concentrations (ppm)

1971

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
K-1203	<0.001	<0.001	<0.001	<0.001	<0.001	0.009	<0.001	0.02	<0.01	0.012	0.004	0.006
K-1700												
K1420 Decon facility → K-1407-B	0.016	0.016	0.016	0.02	0.012	<0.03	<0.001	0.01	0.14	0.005	0.023	0.014
K-1007-B	<0.001	-0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
K-901-A				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
K-1231										<0.001		
K-1515							<0.001	<0.002	0.02	<0.001	<0.001	<0.001
K-1410							<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
K-710							<0.001	<0.002	<0.001	<0.001	<0.001	<0.001

1972

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
K-1203	0.001	0.004	0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001
Stormdrains + 1407-B Hold Pond → K-1700 (1-3)	0.001	<0.001	<0.001	0.001	0.001	0.004	0.001	0.005	0.003	<0.001	0.003	0.002
K-1407-B	0.006	0.008	<0.001	0.004	0.013	0.016	<0.001	0.001	0.005	0.008	0.006	0.006
K-1007-B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.002	<0.001	<0.001	0.002
K-901-A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
K-1231	<0.001			<0.001						<0.001	<0.001	
K-1515	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001				
K-1710	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001			0.002	<0.001
K-1410	<0.001	<0.001	<0.001									

Mercury Concentrations (ppm)

Year	Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1973	K-1407-B	0.009	0.006	0.006	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.003	<0.001
	K-1203	<0.001	<0.001	0.001	0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1007-B	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-901-A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1700	0.008	0.002	0.005	0.001	0.001	0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001
	K-710	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
	K-1231				0.001								
	K-1515		0.002	0.002		<0.001						<0.001	
	K-1410						<0.001						
1974	K-1407-B	0.009	0.005	0.003	0.001	0.001	<0.001	0.002	<0.001	<0.001	<0.001		0.003
	K-1203	<0.001	<0.001	0.003	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.001
	K-1007-B	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.001
	K-901-A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
	K-1700	<0.001	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.008
	K-710	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.01	<0.001	<0.001		0.001
	K-1515		<0.001	<0.001	<0.001	0.001			<0.001		<0.001		
1975	K-1407-B	0.003	<0.001	<0.001	0.002	0.018	0.006	0.007	0.002	0.005	0.01	0.003	0.005
	Sewage trt. → K-1203	0.004	<0.001	<0.001	0.024	0.002	0.003	0.006	0.003	0.008	0.005	0.001	0.003
	lab-hold → K-1007-B	<0.001		<0.001	0.025	0.044	0.001	0.002	<0.001	0.001	0.002	0.001	<0.001
	sludge holdg pond → K-901-A	<0.001		<0.001	0.014	<0.001	0.001	<0.001	0.002	0.002	0.001	<0.001	<0.001
	K-1700	0.006	<0.001	<0.001	0.001	0.018	0.004	0.006	0.005	0.002	0.003	0.002	0.002
	sew trt. plant → K-710	0.002			0.024	0.002	0.013	0.001	<0.001	0.001	0.002	0.002	<0.001
	K-1515	0.001	<0.001	<0.01	0.002	<0.001	0.002	<0.001	<0.001	0.001	<0.001	<0.001	<0.001

Mercury Concentrations (ppm)

Year	Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1976	K-1407-B	0.002	<0.001	0.004	0.004	0.005	0.001	0.009	0.086	0.006	0.001	0.005	0.007
	K-1203	0.003	0.003		0.005	0.003	0.003	0.002	<0.001	0.001	0.002	0.001	0.001
	K-1007-B	<0.001	<0.001	0.001	0.002	0.001	<0.001	0.001	0.002	<0.001	0.002	0.001	0.001
	K-901-A	<0.001	<0.001	0.001	0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.002	<0.001
	K-1700	0.002	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	K-710	0.003	0.001	0.002	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1515	0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001
1977	K-1407-B	<0.001	0.002	<0.001	0.015	0.005	0.014	0.001	<0.001	0.001	0.001		<0.001
	K-1203	<0.001	0.008	0.001	0.002	<0.001	0.002	0.002	0.001	0.001	0.001	<0.001	0.001
	K-1007-B	<0.001	<0.001	<0.001	0.006	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-901-A	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1700	<0.001	0.002	<0.001	0.002	<0.001	0.008	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
	K-710	<0.001	<0.001	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001
	K-1515	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
1978	K-1407-B	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1203	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
	K-1007-B	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001
	K-901-A	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-1700	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	K-710	<0.001	<0.001										
	K-1515	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

CONCENTRATIONS OF MERCURY IN DISCHARGE WATER

(READINGS IN PPM)

		K-1700	K-1203	K-1007-B	K-901-A	K-1515
1979 ****	JAN	< 0.0010	< 0.0010	0.0070	0.0010	0.0
	FEB	< 0.0010	< 0.0010	0.0040	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	0.0010	0.0
	JUL	0.0020	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	0.0010	0.0010	< 0.0010	< 0.0010	0.0
	OCT	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	0.0	0.0	0.0	< 0.0010	0.0
1980 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	OCT	< 0.0010	< 0.0020	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
1981 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	0.0010	0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	OCT	0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
1982 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	0.0040	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	0.0020	0.0
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0

CONCENTRATIONS OF MERCURY IN DISCHARGE WATER

(READINGS IN PPM)

		K-1700	K-1203	K-1007-B	K-901-A	K-1515
1979 ****	JAN	< 0.0010	< 0.0010	0.0070	0.0010	0.0
	FEB	< 0.0010	< 0.0010	0.0040	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	0.0010	0.0
	JUL	0.0020	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	0.0010	0.0010	< 0.0010	< 0.0010	0.0
	OCT	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	0.0	0.0	0.0	< 0.0010	0.0
1980 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	OCT	< 0.0010	< 0.0020	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
1981 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	0.0010	0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	OCT	0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
1982 ****	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	JUL	0.0040	< 0.0010	< 0.0010	0.0020	0.0
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	0.0
	[illegible]	< 0.0010	< 0.0010	[illegible]	[illegible]	[illegible]

CONCENTRATIONS OF MERCURY IN DISCHARGE WATER

(READINGS IN PPM)

		K-1700	K-1203	K-1007-B	K-901-A	K-1515
1979	JAN	< 0.0010	< 0.0010	0.0070	0.0010	*******
	FEB	< 0.0010	< 0.0010	0.0040	< 0.0010	*******
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUN	< 0.0010	< 0.0010	< 0.0010	0.0010	*******
	JUL	0.0020	< 0.0010	< 0.0010	< 0.0010	*******
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	SEP	0.0010	0.0010	< 0.0010	< 0.0010	*******
	OCT	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	DEC	*******	*******	*******	< 0.0010	*******
1980	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	FEB	0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	OCT	< 0.0010	< 0.0020	< 0.0010	< 0.0010	*******
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
1981	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAY	0.0010	0.0010	< 0.0010	< 0.0010	*******
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUL	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	AUG	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	OCT	0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	NOV	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	DEC	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
1982	JAN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	FEB	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	APR	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	MAY	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUN	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******
	JUL	0.0040	< 0.0010	< 0.0010	< 0.0010	*******
	AUG	< 0.0010	< 0.0010	< 0.0010	0.0020	*******
	SEP	< 0.0010	< 0.0010	< 0.0010	< 0.0010	*******

APPROVAL FOR RELEASE

Document: # Unnumbered 1-page ltr, ME Mitchell to JF Wing ; Date ~~(DOE-ORO), FOI REQUEST, MERCURY EMIS-~~

Title/Subject ~~SIONS; and 7-page attachment.~~

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Irwin D. Trist (TB) 1/29/93

K-25 Classification & Information Control Officer — Date

K-25
effl.
1971-82

ChemRisk Document Request Transmittal Form

(This section to be completed by ChemRisk)

S. Sandberg, CEP

Name Division is requested to provide the following document

Address

Date of Request 1/11/93 Expected receipt of document 1/29/93

Title of requested document FOI Request for Data - Mercury in Water

Document Number S02405, S02406, S02407

Access Number of Document Date of Document December 1982

(This section to be completed by Derivative Classifier)

Derivative Classifier T. R. G. Jordan Phone 41695

Date document transmitted to Dr. Quist 1/15/93

Date release received from Dr. Quist OK 082 1/29/93

PUBLIC RELEASE STAMP attached to each copy of document (YES NO)

Date document sent to reproduction Expected Return

Delivered to DRC by Date

(This section to be completed by DRC)

Received by DRC Date

Processed

Mailed

1993 FEB -4 AM 8:46

OAK RIDGE K-25 SITE DOCUMENT RELEASE FORM

Rec'd K-25CO: 1/29/93
c: J Lamb
File-K25CO-RC(4710)
AS Quist, 2/1/93

Person requesting release J. Lamb   Telephone No. (510) 748-5643
Mailing Address ______   Organization ChemRisk
Date by which release is required 1/29/93 ______ (Standard processing time is 5 working days. Some documents require s... and the processing time will be longer).

Note: Two copies of the document must generally be provided to the Classification and Information Control Office with this request. Only one copy of photos and videotapes is required. Documents that include photos must be accompanied by "originals" of the photos.

Approval of request for Classification and Information Control Office to release document (department head or higher):
Signature: J. K. M   Date 1/11/93

DOCUMENT DESCRIPTION (to be completed by requester)

Document number S02405, S02406, S02407   Pages ______
Document title FOI Request for Data - Mercury in Water

Author(s) (indicate other divisions or organizations, if applicable) ______

Document type (See Doc. Prep. Guide, Chs. 1 and 2, for definitions of document types):

☐ Formal Report ☐ Progress Report ☐ Informal R&D Report ☐ Abstract ☐ Drawing
☐ Administrative ☑ Correspondence ☐ Internal Technical Data ☐ Photo ☐ Other Visuals
☐ Journal Article (identify journal): ______
☐ Oral Presentation (identify meeting, sponsor, location, date): ______

Will oral presentation be published in program, booklet, brochure, etc.? ☐ Yes ☐ No ☐ Not Known
Will copies of the oral presentation be distributed ☐ before, ☐ after, ☐ during the meeting? ☐ No distribution will be mad[e]

☐ Other (specify): ______
Purpose of release ______
Previously cleared documents containing similar information ______

Is copyrighted material contained in this document? (If present, attach release.) ☐ Yes ☐ No
Remarks ______

CLASSIFICATION INFORMATION (to be obtained by requester)

Was the work reported in this document funded, in whole or in part, by a classified program at Martin Marietta Energy Systems, Inc.?
☐ No ☐ Yes (Name of program: ______

Is the subject area of this document closely related to a prior or current classified program at Martin Marietta Energy Systems, Inc.?
☐ No ☐ Yes   Within the Department of Energy? ☐ No ☐ Yes

Name or Description of applicable program(s) ______

Additional remarks ______

This document contains no classified information.
Derivative Classifier signature K. S. D[illegible]   Date 1/14/93

SRA
Shonka Research Associates, Inc.

September 10, 1996

To: Tom Widner
Jane McCrodden
Susan Flack
Jack Buddenbaum
SENES

From: D. B. Shonka

Re: Transmittal of updated InMagic ORDR Database for July and August

Memo No. DBS.133

Attached are disks containing the updated electronic version of the Inmagic ORDR Database dated 9/10/96. It includes 67 new InMagic entries plus additions to previously existing entries for documents in a series. It supersedes all other versions. We would appreciate your returning the disks to us for reuse.

Please review your entries to confirm that they have all been included and report any typos or missing DSF's to Sylvia Goodyear. Also note that documents in a series are entered in one InMagic file unless they are physically located different places.

To load the new version:

Insert disk 1 into floppy drive
From the InMagic database directory
Type: `A:INSTALL A:` `(B:INSTALL B: for B-drive)`
Follow onscreen directions

The new data is now loaded.

To browse only the new files entered, select all files entered since July 1, 1996.

open database
OakRidge
Enter (when prompted for a password, strike the <enter> key)
Search
F10 Add prompt
and
entered
>6-30-96
Search
67 records found

Please contact Thom Sukalac if you have any problems loading the new files.

4939 Lower Roswell Road, Suite 106
Marietta GA 30068
(770) 509-7606 ph.
(770) 509-7507 fax

✓2879 Boegly T-4
✓2882 } code words 40's/50's
✓2883 }

2916 1955-58 Hg $\boxed{H_2O}$ 783?
Kwasnoski

2918 1959-62 " (1°ly H_2O loops recirc)

• 2919 has "CW" locations

~~2921 64-68~~

2923 any results? or just requests?

Susan M. Flack

(669) RWD annual

55-1-212

(675) 55-12-170 (673) 57-1-172

(672) 57-12-143

(2509)

1581 Drex WD.

Hi Jen!

My account is way overdrawn- I've been waiting for you to say that the Inmagic repository is now located in Boulder. However, I'd like to look at the following recent Inmagic entries:

2879	Bogely- Task 4
2882	40s code words
2883	50s code words

(ARE THESE NEXT 2 DOCS THE source of the CW-1 concs that gretchen and mongan were recently playing with?)

2916	1955-58 Hg water concs by Kwasnoski (how is this different from Rep. No. 783?)
2918	1959-62 Hg water concs by Kwasnoski
2919	includes a map of "CW" sampling locations
2921	says "primarily" hg concs in recirc water loops- what else?
2923	does this doc contain any results, or just requests?

THX!!!
Susan.

I am sending you document 2879 and the map from 2919. Document 2921 is only mercury concentrations in the recirculating water loops. Sorry for the misunderstanding. Document 2923 does not contain any results, just requests for sample collection and analysis-- a standard letter that was sent every couple months.

Jennifer

June 1955

TABLE V

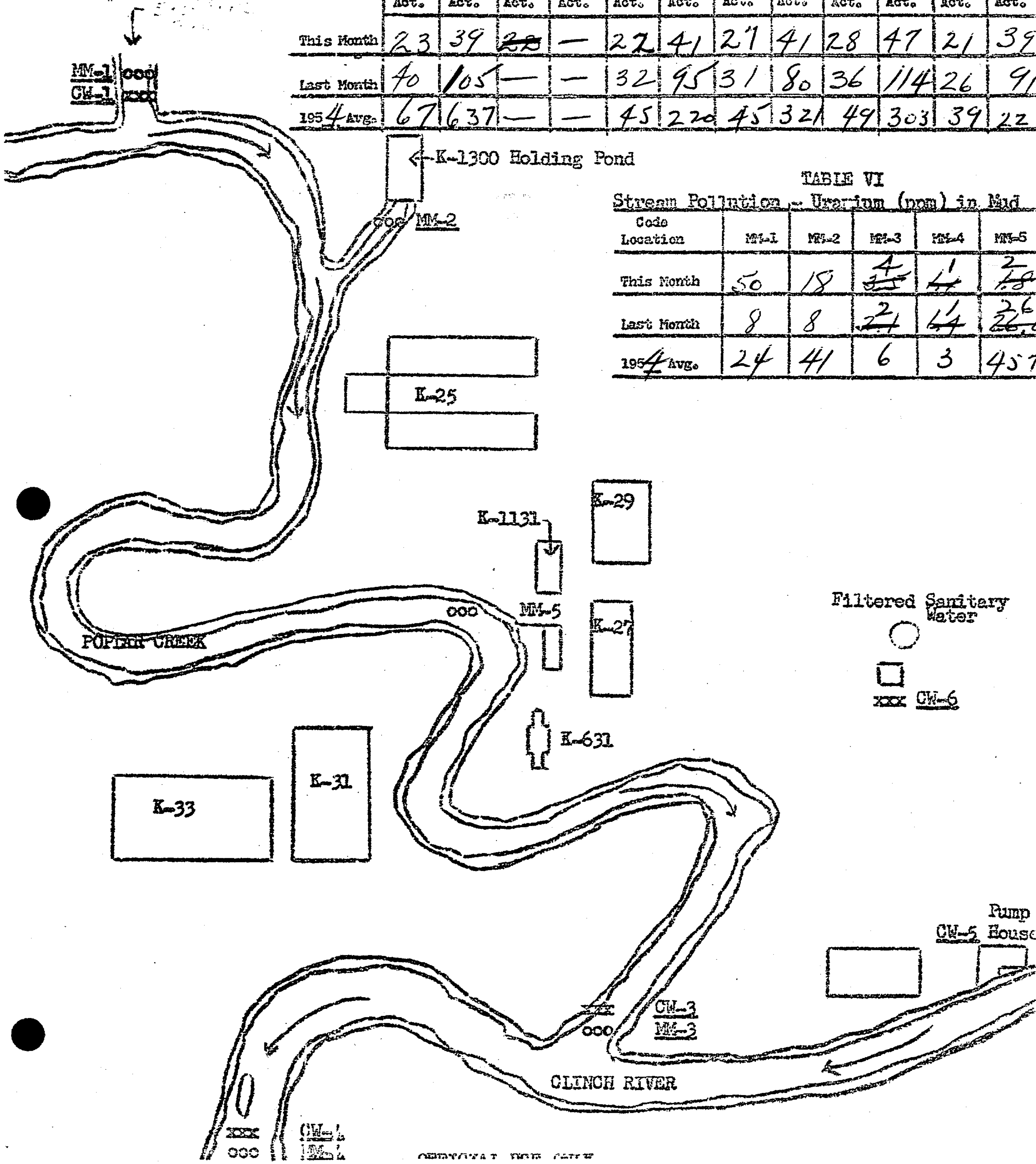
Water Sampling - Beta Activity (c/m/100ml.)

Code Location	CW-1		CW-2		CW-3		CW-4		CW-5		CW-6	
	Avg. Act.	Peak Act.	Avg. Act.	Peak Act.	Avg. Act.	Peak Act.	Avg. Act.	Peak Act.	Avg. Act.	Peak Act.	Avg. Act.	Peak Act.
This Month	23	39	~~22~~	—	22	41	21	41	28	47	21	39
Last Month	40	105	—	—	32	95	31	80	36	114	26	91
1954 Avg.	67	637	—	—	45	220	45	321	49	303	39	22

TABLE VI

Stream Pollution - Uranium (ppm) in Mud

Code Location	MM-1	MM-2	MM-3	MM-4	MM-5
This Month	50	18	4 ~~3.5~~	1 ~~.4~~	2 ~~.18~~
Last Month	8	8	2 ~~2.1~~	1 ~~.4~~	26 ~~26.~~
1954 Avg.	24	41	6	3	457



Jennifer K. Lamb

Map from #2919

Rep No. 783

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

S. Flack / 1034A Document Center
Requestor — Document Center (is requested to provide the following document)

Date of request 7/20/95 — Expected receipt of document 8/15/95

Document number KLI-3621 — Date of document 10/19/55

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 7/20/95

Date submitted to ADC 7/20/95

Date submitted to HSA Coordinator 7/20/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 7/20/95

Date received from CICO 7-21-95

Date submitted to ChemRisk/Shonka and DOE 7-21-95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

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[redacted] INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO K. M. Jones
LOCATION K-1101

DATE October 19, 1955

ANSWERING LETTER DATE

ATTENTION

COPY TO L. L. Anthony, J. C. Barton, C. C. Fowlkes, T. Kwasnoski, D. M. Lang, C. H. Mahoney, J. A. Parsons, R. C. Rhees, J. E. Rothfleisch, P. R. Vanstrum, M. F. Schwenn, S. H. Smiley, H. G. P. Snyder, Technical Division K-1005 File (K25RC)

SUBJECT Water Sampling Program for Mercury, September 1955

KLI-3621

In compliance with the request of the meeting of September 2, 1955, on "Cooling Water and Freon Condenser Failures," the sampling program for mercury was set up and carried out through the month of September. The results, which are presented in Table I, not only show the level of mercury which is entering the plant at the K-891 pumphouse, but also the quantities which are leaving the Y-12 area.

The East Fork junction sample is a continuous, semi-weekly sample taken primarily for the purpose of measuring the radioactivity in the water at that point. The K-891 Supply sample is a continuous sample set up and taken approximately every 2 - 3 days by Utilities Operations. The daily effluent from Y-12 was obtained over a two-week period by the Health Physics Department at Y-12 from a continuous sampler placed in Poplar Creek at the weir behind the Y-12 plant by personnel of the Special Analysis Department. The weekly composite of effluent from Y-12 represents a composite of daily dip samples taken by Y-12 personnel.

At present, only the East Fork junction and the K-891 Supply samples are being analyzed.

T. C. Whitson

T. C. Whitson
Special Analysis Department
Technical Division

TCW:jd

This document has been approved for release to the public by: Gary W. Hall for A.S. Quist 7/21/95
Technical Information Officer Date
Oak Ridge K-25 Site

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by authority of: K25 Site
Arvin S Quist, Classification Officer
(Authorized Declassifier's name and organization)
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(Official declass. notice memo, TIC notice, etc.)
OBMcCaskill 3/9/93
(Person making change) (date)
Stephanie Norton 3/10/93
(Document identification verified by) (date)

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WCX-163 (3-51) THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

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[redacted]

TABLE I

WATER SAMPLING PROGRAM FOR MERCURY, SEPTEMBER 1955

Date	East Fork Junction With Poplar Creek, ppb. Hg	K-891 Supply, ppb. Hg	Daily Effluent From Y-12 at Weir, ppb. Hg	Weekly Composite of Effluent from Y-12	
				K-25 Anal. ppb. Hg	Y-12 Anal. ppm. Hg
9/9			820	990	1.16
9/12			870		
9/13	640		2460		
9/14			2240		
9/15			1870		
9/16	220		1910	1900	1.89
9/17 through 9/18			1500		
9/19		0	2110		
9/20	120		1860		
9/21		16	----		
9/22			1020		
9/23	110	22		1680	1.09
9/27	170				
9/30		32		1040	0.84

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[redacted]

SMF

CONFIDENTIAL INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

UNCLASSIFIED

TO K. M. Jones
LOCATION K-1101

DATE October 19, 1955

ANSWERING LETTER DATE

ATTENTION

COPY TO

L. L. Anthony	R. C. Rhees
J. C. Barton	J. E. Rothfleisch
C. C. Fowlkes	P. R. Vanstrum
T. Kwasnoski	M. F. Schwenn
D. M. Lang	S. H. Smiley
C. H. Mahoney	H. G. P. Snyder
J. A. Parsons	Technical Division K-1005 File (K25RC) ✓

SUBJECT Water Sampling Program for Mercury, September 1955

KLI-3621

RC

In compliance with the request of the meeting of September 2, 1955, on "Cooling Water and Freon Condenser Failures," the sampling program for mercury was set up and carried out through the month of September. The results, which are presented in Table I, not only show the level of mercury which is entering the plant at the K-891 pumphouse, but also the quantities which are leaving the Y-12 area.

The East Fork junction sample is a continuous, semi-weekly sample taken primarily for the purpose of measuring the radioactivity in the water at that point. The K-891 Supply sample is a continuous sample set up and taken approximately every 2 - 3 days by Utilities Operations. The daily (9-9 to 9-22) effluent from Y-12 was obtained over a two-week period by the Health Physics Department at Y-12 from a continuous sampler placed in Poplar Creek at the weir behind the Y-12 plant by personnel of the Special Analysis Department. The weekly composite of effluent from Y-12 represents a composite of daily dip samples taken by Y-12 personnel.

At present, only the East Fork junction and the K-891 Supply samples are being analyzed.

T. C. Whitson

T. C. Whitson
Special Analysis Department
Technical Division

TCW:jd

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K-25 Site Classification Officer
(Authorized Declassifier's name and organization)
(Official declass. notice memo, TIC notice, etc.) 2/3/93 (date)
(Person making change) 2/3/93 (date)
(Document identification verified by) 2/3/93 (date)
KLI-3621

APPROVAL FOR RELEASE

Document: # KLI-3621 ; Date 10/19/55 ;
Title/Subject 2-page ltr., TC Whitson to KM Jones, Water Sampling Program for Mercury, September 1955

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Arvin S. Quist 2/3/93
K-25 Classification & Information Control Officer Date

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UCX-163 (3-51) THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

TABLE I

WATER SAMPLING PROGRAM FOR MERCURY, SEPTEMBER 1955

Date	East Fork Junction With Poplar Creek, ppb. Hg	K-891 Supply, ppb. Hg	Daily Effluent From Y-12 at Weir, ppb. Hg	Weekly Composite of Effluent from Y-12 K-25 Anal. ppb. Hg	Weekly Composite of Effluent from Y-12 Y-12 Anal. ppm. Hg
9/9			820	990	1.16
9/12			870		
9/13	640		2460		
9/14			2240		
9/15			1870		
9/16	220		1910	1900	1.89
9/17 through 9/18			1500		
9/19		0	2110		
9/20	120		1860		
9/21		16	----		
9/22			1020		
9/23	110	22		1680	1.09
9/27	170				
9/30		32		1040	0.84

~~CONFIDENTIAL~~

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INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY UNION CARBIDE NUCLEAR COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

UNCLASSIFIED

TO K. M. Jones
LOCATION K-1101

DATE December 12, 1955

ANSWERING LETTER DATE

ATTENTION

COPY TO
L. L. Anthony
J. C. Barton
C. C. Fowlkes
T. Kwasnoski
D. M. Lang
C. H. Mahoney
R. C. Rhees
J. E. Rothfleisch (35)
M. F. Schwenn
S. H. Smiley
H. G. P. Snyder
P. R. Vanstrum
Technical Division K-1005 File (K
Technical Division K-1401 File (K

SUBJECT Water Sampling Program for Mercury, October and November 1955

KLI-3654

APPROVAL FOR RELEASE

Document: # KLI-3654 ; Date 12/12/1955

Title/Subject 2-page ltr, TKwasnoski/TCWhitson : KM Jones, "Water Sampling Program for Mercury, October and November 1955"

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Arvin S. Quist 2/3/93
K-25 Classification & Information Control Officer Date

Additional data on the mercury content of K-25 area waters have been compiled for the months October and November 1955. Continuous semi-weekly samples were taken from the following points: East Fork junction with Poplar Creek, K-891 supply water, K-1513 pumphouse influent (Clinch River) and effluent from the water purification plant.

~~The results~~, expressed in parts per billion of mercury, are presented in Table I.

T Kwasnoski
T. Kwasnoski

T. C. Whitson
T. C. Whitson
Special Analysis Department
Technical Division

: BCW:dd

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K-25 Site Classification Officer
(Authorized Declassifier's name and organization)
(Official declass. notice memo, TIC notice, etc.) 2/3/93 (date)
(Person making change) 2/3/93 (date)
(Document identification verified by) (date)

TABLE I

MERCURY CONTENT OF K-25 AREA WATERS, OCTOBER AND NOVEMBER 1955

Date	East Fork Junction with Poplar Creek ppb. Hg	Clinch River at K-1513 Pumphouse ppb. Hg	Effluent from Water Purification Plant ppb. Hg	K-891 Supply Water ppb. Hg
10/4	68	5	1	
10/10	1440	7	5	
10/11	460	7	4	
10/14	640	5	4	
10/18	344	---	8	68
10/21	588	8	7	17
10/24	----	---	---	18
10/25	768	5	1	----
10/26	----	---	---	36
10/28	1056	0	0	32
11/4	480	2	3	
11/8	168	5	7	
11/14	376	4	4	45
11/16	360	8	8	22
11/18	204	6	6	94
11/21	----	----	---	98
11/22	424	22	7	---
11/23	---	---	---	128
11/25	156	6	7	16
11/30	344	7	14	86

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INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

UNCLASSIFIED

TO K. M. Jones
LOCATION K-1101

DATE January 26, 1956

ANSWERING LETTER DATE

ATTENTION

COPY TO L. L. Anthony
J. C. Barton
C. C. Fowlkes
D. M. Lang
C. H. Mahoney
R. C. Rhees
J. E. Rothfleisch (35)
M. F. Schwenn
S. H. Smiley
H. G. P. Snyder
P. R. Vanstrum
Technical Division K-1005 File (K25RC)
Technical Division K-1401 File (K25RC)

SUBJECT Water Sampling Program for Mercury, December 1955

KLI-3693

OK

Additional data on the mercury content of K-25 area waters for the month of December is presented. Continuous semi-weekly samples were taken from the following points: East Fork junction with Poplar Creek, Clinch River at K-1513 pumphouse, effluent from the water purification plant, and the K-891 supply water.

The results expressed in parts per billion of mercury are shown in table I.

The results of three special samples taken from C, E, and G loops on December 30th are presented in table II.

T. C. Whitson
T. C. Whitson

T. Kwasnoski
T. Kwasnoski
Special Analysis Department
Technical Division

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TCW:TK

RES...

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K-25 Site Classification Officer
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(Official declass notice memo, TIC notice, etc.)
2/3/93
(Person making change) (date)
2/3/93
(Document identification verified by) (date)

APPROVAL FOR RELEASE

Document: # KLI-3693 ; Date 1/26/56 ;
Title/Subject 2-page ltr, Whitson & Kwasnoski to KM Jones, "Water Sampling Program for Mercury, December 1955"

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

K-25 Classification & Information Control Officer 2/3/93 Date

WCR-163 (3-51) THIS FORM FOR INTER-COMPANY CORRESPONDENCE ONLY

TABLE I

MERCURY CONTENT OF K-25 AREA WATERS, DECEMBER 1955

Date	East Fork Junction with Poplar Creek ppb. Hg	Clinch River at K-1513 Pumphouse ppb. Hg	Effluent from Water Purification Plant ppb. Hg	K-891 Supply Water ppb. Hg
12/2	243	14	7	30
12/5	80	8	7	98
12/9	312	8	13	25
12/12	----	----	----	26
12/13	336	2	5	----
12/14	----	----	----	75
12/16	248	19	14	27
12/19	----	----	----	68
12/20	200	8	8	----
12/21	----	----	----	37
12/23	272	4	6	72
12/26	----	----	----	40
12/27	656	7	0	----
12/29	320	12	7	----

TABLE II

SAMPLES FROM C, E, AND G LOOPS, DECEMBER 30th

Date	"C" Loop ppb. Hg	"E" Loop ppb. Hg	"G" Loop ppb. Hg
12/30	68	80	78

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APPROVAL FOR RELEASE

Document: # KLI-3705 Parts ; Date

Title/Subject WATER SAMPLING PROGRAM FOR MERCURY by TC Whitson

Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Arvin S. Quist 7/3/93

K-25 Classification & Information Control Officer Date

KLI-3705 Parts DECLASSIFIED

by authority of: Arvin S. Quist, 1/29/93 K-25 Site Classification Officer

(Authorized Declassifier's name and organization)

or Virginia D. Bullen 5/3/93

(Official declass. notice memo, TIC notice, etc.) (Person making change) (date)

Gary W. Hall 2/3/93

(Document identification verified by) (date)

WATER SAMPLING PROGRAM FOR MERCURY

T. C. Whitson

UNION CARBIDE NUCLEAR COMPANY

A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

Oak Ridge, Tennessee

Acting Under U.S. Government Contract W-[illegible]

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INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO K. M. Jones

LOCATION K-1101

DATE February 10, 1956

ANSWERING LETTER DATE

ATTENTION

COPY TO
L. L. Anthony
J. C. Barton
C. C. Fowlkes
T. Kwasnoski
D. M. Lang
C. H. Mahoney
J. A. Parsons
R. C. Rhees
J. E. Rothfleisch (35)
M. F. Schwenn
S. H. Smiley
H. G. P. Snyder
P. R. Vanstrum
Technical Division K-1005 File (K25RC)
Technical Division K-1401 File (K25RC)

SUBJECT Water Sampling Program for Mercury, January 1956

KLI-3705-1

A report of the mercury content of K-25 area waters for the month of January is presented. Continuous semi-weekly samples were taken from the following points: East fork junction with Poplar Creek, Clinch River at K-1513 pumphouse, effluent from water purification plant, and K-891 supply water.

The results expressed in parts per billion of mercury are shown in Table I.

The results of three samples taken from C, E, and G Loops on January 30th are presented in Table II.

T. C. Whitson

T. C. Whitson
Special Analysis Department
Technical Division

TCW:jd

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WCX-163 (3-51)

TABLE I

RESULTS OF WATER SAMPLING PROGRAM FOR JANUARY. 1956

Date	East Fork Junction with Poplar Creek ppb. Hg	Clinch River at K-1513 Pumphouse ppb. Hg	Effluent from Water Purification Plant ppb. Hg	K-891 Supply Water ppb. Hg
1/3	240	8	22	---
1/5	---	--	--	60
1/6	256	5	5	30
1/10	108	4	8	25
1/13	216	2	4	82
1/14	----	---	---	84
1/17	392	7	14	94
1/18	---	---	---	114
1/20	900	2	14	60
1/24	88	7	14	---
1/27	196	8	7	---
1/31	176	28	36	---

TABLE II

SAMPLES FROM C, E, AND G LOOPS, JANUARY 30th

Date	"C" Loop ppb. Hg	"E" Loop ppb. Hg	"G" Loop ppb. Hg
1/30/56	42	64	80

CONFIDENTIAL **INTER-COMPANY CORRESPONDENCE**

(INSERT NAME) COMPANY UNION CARBIDE NUCLEAR COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO K. M. Jones
LOCATION K-1101

DATE March 7, 1956

ANSWERING LETTER DATE

ATTENTION

COPY TO L. L. Anthony
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C. H. Mahoney
R. C. Rhees
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M. F. Schwenn
H. G. P. Snyder
P. R. Vanstrum
Technical Division K-1005 File (K25RC)
Technical Division K-1401 File (K25RC)

SUBJECT Water Sampling Program for Mercury, February 1956

KLI-3705-2

Data on the mercury content of K-25 area waters for the month of February are presented. Continuous semi-weekly samples were taken from the following points: East Fork junction with Poplar Creek, Clinch River at K-1513 pumphouse, effluent from the water purification plant, and K-891 supply water.

The results expressed in parts per billion of mercury are shown in Table I. The results of 3 special samples taken from C, E, and G Loops on February 26 are presented in Table II.

T. C. Whitson

T. C. Whitson
Special Analysis Department
Technical Division

TCW:jd

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WCX-163 (3-51)

TABLE I

MERCURY CONTENT OF K-25 AREA WATERS, FEBRUARY 1956

Date	East Fork Junction with Poplar Creek ppb. Hg	Clinch River at K-1513 Pumphouse ppb. Hg	Effluent from Water Purification Plant ppb. Hg	K-891 Supply Water ppb. Hg
2/1	---	---	---	14
2/3	---	---	---	4
2/4	0	4	5	---
2/7	16	7	5	---
2/10	72	2	5	14
2/13	153	8	11	---
2/17	68	2	5	4
2/20	16	12	7	4
2/24	44	2	4	8
2/28	68	7	4	---

TABLE II

SAMPLES FROM C, E, AND G LOOPS, FEBRUARY 26, 1956

Date	"C" Loop ppb. Hg	"E" Loop ppb. Hg	"G" Loop ppb. Hg
2/26	12	5	22

CONFIDENTIAL *INTER-COMPANY CORRESPONDENCE*

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

To: K. M. Jones
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: April 20, 1956

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M. F. Schwenn
S. H. Smiley
H. G. P. Snyder
P. R. Vanstrum
Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Subject: Water Sampling Program for Mercury, March 1956

KLI-3705-3

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the month of March is presented. Continuous semi-weekly samples were taken from the following points: East Fork Junction with Poplar Creek, Clinch River at K-1513 pumphouse, effluent from the water purification plant, and K-891 supply water. An additional sampling point, Clinch River one mile below last plant area effluent, has been included in this report.

The results expressed in parts per billion of mercury are shown in Table I.

The results of three special samples taken from C, E, and G loops on March 30 are presented in Table II.

for T. C. Whitson
Special Analysis Department
Technical Division

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TABLE I

MERCURY CONTENT OF K-25 AREA WATERS, MARCH 1956

Date	East Fork Junction with Poplar Creek ppb. Hg	Clinch River One Mile Below Last Plant Effluent ppb. Hg	Clinch River at K-1513 Pumphouse ppb. Hg	Effluent from Water Purification Plant ppb. Hg	K-891 Supply Water ppb. Hg
3/2/56	40	---	0	0	22
3/6/56	52	4	0	0	0
3/7/56	---	--	--	--	9
3/9/56	48	19	0	4	--
3/13/56	156	0	48	17	28
3/16/56	188	70	28	36	14
3/20/56	20	4	5	2	--
3/23/56	28	4	7	5	--
3/26/56	32	5	1	4	--
3/30/56	100	8	5	4	16

TABLE II

SAMPLES FROM C, E, AND G LOOPS, MARCH 1956

Date	"C" Loop ppb. Hg	"E" Loop ppb. Hg	"G" Loop ppb. Hg
3/30/56	32	11	47

CONFIDENTIAL INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

To: K. M. Jones
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: June 25, 1956

Subject: Water Sampling Program for Mercury, April and May 1956

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Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

KLI-3705-4

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the months of April and May are presented. Continuous semi-weekly samples were taken from the following points: east fork junction with Poplar Creek, Clinch River one mile downstream, Clinch River at the K-1513 pumphouse, effluent from water purification plant, and K-891 supply water.

The results expressed in parts per billion of mercury for the month of April are shown in Table I and the results for the month of May are shown in Table II. A significant drop in the level of the east fork samples over previous periods is evident. The results of three special samples taken from C, E, and G loops on May 26th are shown in Table III.

T. C. Whitson

T. C. Whitson
Special Analysis Department
Technical Division

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT
AREA WATERS, APRIL 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent from Water Purification Plant, ppb. Hg	K-891 Supply Water, ppb. Hg
4/2/56					17
4/3/56	16	4	8	6	--
4/6/56	24	14	0	0	1
4/10/56	4	0	1	4	6
4/13/56	8	0	0	0	--
4/17/56	2	0	0	0	--
4/20/56	12	0	2	0	--
4/24/56	12	6	8	6	--
4/27/56	0	0	0	0	11
4/30/56	--	--	--	--	

TABLE II

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT
AREA WATERS, MAY 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent from Water Purification Plant, ppb. Hg	K-891 Supply Water, ppb. Hg
5/1/56	0	0	0	7	--
5/4/56	29	0	0	0	--
5/8/56	0	0	0	0	--
5/11/56	0	0	0	0	--
5/15/56	0	0	0	0	--
5/18/56	0	0	0	0	--
5/22/56	0	0	26	10	--
5/23/56	--	--	--	--	65
5/25/56	65	10	13	5	33
5/26/56	--	--	--	--	16
5/29/56	72	13	15	52	--

TABLE III

SAMPLES FROM C, E, AND G LOOPS, MAY 26, 1956

"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
71	85	75

INTER-COMPANY CORRESPONDENCE

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~~Union Carbide~~ Union Carbide Nuclear Company

A Division of Union Carbide and Carbon Corporation

To: K. M. Jones
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: August 3, 1956

Subject: Water Sampling Program for Mercury, June 1956

KLI-3705-5

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Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the month of June are presented. Continuous semi-weekly samples were taken from the following points: east fork junction with Poplar Creek, Clinch River one mile downstream, Clinch River at K-1513 pumphouse, effluent from water purification plant, and K-891 supply water.

The results expressed in parts per billion of mercury for the month of June are shown in Table I. A significant increase in the level of the east fork samples over recent periods is evident for the first part of the month. The results of three special samples taken from C, E, and G loops on June 30 are shown in Table II.

T. C. Whitson

T. C. Whitson
Special Analytical Services Department
Technical Division

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TABLE I

MERCURY CONTENT OF ORGDP AREA WATERS, June 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent from Water Purification Plant, ppb. Hg	K-891 Supply Water ppb. Hg
6/1/56	1158	62	54	62	290
6/5/56	1360	62	0	0	4
6/8/56	1158	0	0	4	7
6/12/56	72	0	0	29	0
6/15/56	72	0	0	0	---
6/20/56	376	0	0	0	---
6/25/56	0	13	7	11	---
6/26/56	0	11	4	0	43
6/29/56	145	11	13	11	33

TABLE II

SAMPLES FROM C, E, AND G LOOPS, June 30th

"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
58	65	72

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UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

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From: [illegible]

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Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Subject: Water Sampling Program for Mercury, July and August 1956

KLI-3705-6

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the months of July and August are presented. Continuous semi-weekly samples were taken from the following points: East fork junction with Poplar Creek, K-891 supply water, Clinch River at the K-1513 pumphouse, effluent from the water purification plant, and Clinch River one mile downstream. Weekly analyses of samples from the last three of the above location were discontinued during August and an analysis was made on a composite from each location at the end of the month.

The results expressed in parts per billion of mercury for the month of July and August are shown in Table I. The results of three special samples taken from C, E, and G Loops on July 28 are shown in Table II.

T. C. Whitson

T. C. Whitson
Special Analytical Services Department
Technical Division

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS, JULY AND AUGUST 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent from Purification Plant, ppb. Hg	K-891 Supply Water, ppb. Hg
7/3/56	58	4	4	4	33
7/6/56	16	2	3	3	2
7/10/56	50	3	2	--	---
7/13/56	3	0	0	0	16
7/17/56	44	0	0	0	---
7/20/56	24	0	7	7	---
7/24/56	12	3	7	1	---
7/27/56	35	8	1	3	172
7/31/56	13	5	0	1	35
8/3/56	15	3	10	3	---
8/7/56	44	8	12	8	---
8/10/56	120	-	--	-	20
8/14/56	108	-	--	-	12
8/17/56	16	-	--	-	---
8/21/56	536	-	--	-	---
8/24/56	34	-	--	-	---
8/31/56	156	12*	1*	1*	78

*Monthly Composite

TABLE II

SAMPLES FROM C, E, AND G LOOPS, JULY 28 [illegible]

"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
68	92	126

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UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

To: Mr. K. M. Jones
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: November 23, 1956

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Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Subject: Water Sampling Program for Mercury, September and October 1956

KLI-3705-7

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the months of September and October are presented. Continuous semi-weekly samples were taken from East fork at junction with Poplar Creek and the K-891 supply water. The results of the analyses expressed in parts per billion are shown in Table I.

Poplar Creek samples continue to show significant quantities of mercury. In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in Table II.

T. C. Whitson

T. C. Whitson
Laboratory Services Section
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Works Laboratory
Technical Division

TCW:jd

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS, SEPTEMBER AND OCTOBER 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	K-891 Supply Water, ppb. Hg
9/4/56	224	---
9/9/56	100	---
9/11/56	146	---
9/14/56	32	---
9/18/56	30	---
9/21/56	72	92
9/24/56	236	---
9/28/56	156	---
10/2/56	204	---
10/5/56	183	---
10/9/56	76	---
10/12/56	28	---
10/16/56	40	---
10/17/56	---	16
10/19/56	146	---
10/22/56	76	---
10/24/56	---	282
10/26/56	246	21
10/30/56	---	31
10/31/56	378	32

TABLE II

MERCURY CONTENT IN MONTHLY COMPOSITE SAMPLES

Month	Clinch River, One mile downstream, ppb. Hg	Clinch River, at K-1513 Pumphouse, ppb. Hg	Effluent from Purification Plant, ppb. Hg
September	0	0	0
October	0	0	0

CONFIDENTIAL INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

To: Mr. K. M. Jones
K-1101

Plant: Oak Ridge Gaseous Diffusion

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T. C. Whitson
Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Subject: Water Sampling Program for Mercury, November and December 1956

KLI-3705-8

Data on the mercury content of Oak Ridge Gaseous Diffusion Plant area waters for the months of November and December 1956 are presented. Continuous semi-weekly samples were taken from east fork at junction with Poplar Creek and the K-891 supply water. The results of the analyses expressed in parts per billion are shown in Table I.

In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in Table II. Results on three loop samples taken on December 30th are shown in Table III.

T. C. Whitson

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS, NOVEMBER AND DECEMBER 1956

Date	East Fork Junction with Poplar Creek, ppb. Hg	K-891 Supply Water ppb. Hg
11/2/56	14	----
11/6/56	244	----
11/10/56	116	----
11/12/56	336	52
11/13/56	831	----
11/16/56	----	112
11/20/56	148	----
11/23/56	160	44
11/27/56	600	----
11/31/56	324	----
12/7/56	56	----
12/11/56	60	----
12/17/56	32	----
12/18/56	260	----
12/21/56	52	----
12/26/56	40	----

TABLE II

MERCURY CONTENT IN MONTHLY COMPOSITE SAMPLES

Month	Clinch River, One Mile Downstream ppb. Hg	Clinch River, at K-1513 Pumphouse ppb. Hg	Effluent from Purification Plant ppb. Hg
November	0	2	Opp. Error
December	4	2	4

TABLE III

SAMPLES FROM C, E, AND G LOOPS, DECEMBER 29TH

"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
46	0	56

INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

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To: Mr. L. L. Anthony
K-303-8

Plant: Oak Ridge Gaseous Diffusion

Date: May 1, 1957

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P. R. Vanstrum
T. C. Whitson
Technical Division K-1005 File (RC)✓
Technical Division K-1401 File (RC)

Subject: Water Sampling Program for Mercury - January, February, and March, 1957

KLI-3705-9

Data on the mercury content of the Oak Ridge Gaseous Diffusion Plant area waters for the months of January, February, and March are presented. Continuous semi-weekly samples were taken from East Fork at the junction with Poplar Creek and the K-891 supply water. The results of the analyses expressed in parts per billion are shown in table I.

In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in table II. Results of monthly samples from C, E, and G loops are shown in table III. The results of East Fork samples for this report period are significantly higher than those obtained in November and December 1956.

/evo

T. C. Whitson
T. C. Whitson

T Kwasnoski
T. Kwasnoski
Laboratory Services Section
Special Analytical Services Department
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WCX-163 (8-55)

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS - JANUARY, FEBRUARY, AND MARCH 1957

Date	East Fork Junction with Poplar Creek, ppb. Hg	K-891 Supply Water, ppb. Hg
1/1/57	540	7
1/4/57	2176	--
1/8/57	336	--
1/11/57	354	68
1/15/57	316	--
1/18/57	456	--
1/22/57	784	--
1/25/57	560	56
1/29/57	7	2
1/30/57	---	4
2/1/57	40	8
2/5/57	72	--
2/6/57	---	29
2/8/57	92	16
2/12/57	72	--
2/15/57	8	8
2/19/57	136	--
2/22/57	216	--
2/26/57	1236	--
3/1/57	354	148
3/5/57	940	--
3/8/57	208	52
3/12/57	228	--
3/19/57	60	--
3/21/57	128	--
3/26/57	140	--
3/29/57	136	--

TABLE II

MERCURY CONTENT IN MONTHLY COMPOSITE SAMPLES

Month	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent From Water Purification Plant, ppb. Hg
January	0	0	0
February	0	4	20
March	0	4	7

TABLE III

MERCURY CONTENT OF
SAMPLES FROM C, E, AND G LOOPS

Date	"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
12-29-56	46	0	56
1-28-57	152	152	80
2-22-57	84	84	24

INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

CONFIDENTIAL

To: L. L. Anthony
K-303-8

Plant: Oak Ridge Gaseous Diffusion

Date: September 6, 1957

Subject: Water Sampling Program for Mercury - April, May, and June, 1957

KLI-3705-10

Copies To: J. C. Barton
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T. C. Whitson
Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)

Data on the mercury content of the Oak Ridge Gaseous Diffusion Plant area waters for the months of April, May, and June, 1957, are presented. Continuous semi-weekly samples were taken from East Fork at the junction with Poplar Creek and K-891 supply water. The results of the analyses expressed in parts per billion of mercury are shown in table I.

In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in table II. The results of monthly samples taken from the C, E, and G loops are shown in table III.

T. C. Whitson

T. C. Whitson

T. Kwasnoski

T. Kwasnoski
Laboratory Services Section
Special Analytical Services Department
Technical Division

/evo

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WCX-163 (8-55)

This form for Inter-Company Correspondence only

TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS

Date	Poplar Creek at East Fork Junction, ppb. Hg	K-891 Supply Water, ppb. Hg
4-2-57	80	30
4-5-57	84	56
4-9-57	24	--
4-12-57	464	--
4-16-57	1024	52
4-23-57	108	--
4-26-57	160	60
4-30-57	392	70
5-3-57	10	52
5-4-57	--	72
5-7-57	44	81
5-10-57	304	68
5-12-57	--	112
5-13-57	--	86
5-14-57	320	136
5-17-57	56	38
5-21-57	62	--
5-24-57	24	140
5-28-57	184	--
5-31-57	200	368
6-4-57	64	34
6-7-57	68	--
6-11-57	0	4
6-14-57	0	--
6-18-57	416	--
6-21-57	56	468
6-25-57	46	--
6-28-57	64	40

TABLE II

MERCURY CONTENT IN MONTHLY COMPOSITE SAMPLES

Month	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent From Water Purification Plant, ppb. Hg
April	0	0	10
May	4	0	4
June	14	4	14

TABLE III

MERCURY CONTENT OF SAMPLES FROM C, E, AND G LOOPS

Date	"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
5-29-57	192	152	560
6-28-57	44	72	76

ChemRisk/Shonka Research Associates, Inc., Document Request Form

(This section to be completed by subcontractor requesting document)

S. Flack / 1034 A Document Center

Requestor — Document Center (is requested to provide the following document)

Date of request 7/17/95 Expected receipt of document 8/11/95

Document number KLI-4236-1 Date of document 10/7/57

Title and author (if document is unnumbered)

(This section to be completed by Document Center)

Date request received 7/20/95

Date submitted to ADC 7/20/95

Date submitted to HSA Coordinator 7/20/95

(This section to be completed by HSA Coordinator)

Date submitted to CICO 7/20/95

Date received from CICO 7-27-95

Date submitted to ChemRisk/Shonka and DOE 7-27-95

(This section to be completed by ChemRisk/Shonka Research Associates, Inc.)

Date document received

Signature

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UNCLASSIFIED *INTER-COMPANY CORRESPONDENCE*

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide ~~and Carbon Corporation~~

~~CONFIDENTIAL~~

To: W. C. Hartman
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: October 7, 1957

Copies To: J. C. Barton
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K. M. Jones
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B. R. Webb
T. C. Whitson
Technical Division K-1005 File
Technical Division K-1401 File

Subject: Water Sampling Program for Mercury - July, August, and September, 1957

KLI-4236-1

APPROVAL FOR RELEASE

Document: # KLI-4236-1 ; Date 10/7/57 ;
Title/Subject 3-pages, TC Whitson/T Kwasnoski to WC Hartman, "Water Sampling Program for Mercury-July, August, and September 1957"
Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Arvin S. Quist 2/3/93
K-25 Classification & Information Control Officer Date

Data on the mercury content of the Oak Ridge Gaseous Diffusion Plant area waters for the months of July, August, and September, 1957 are presented. Continuous semi-weekly samples were taken from the East Fork at the junction with Poplar Creek, at K-891 supply point, and at the K-901 make-up point. These results, expressed in parts per billion of mercury, are shown in table I.

In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in table II. The results of monthly samples taken from the C, E, and G loops are shown in table III.

T Kwasnoski for T. C. Whitson

T Kwasnoski
T. Kwasnoski
Laboratory Services Section
Special Analytical Services Department
Technical ~~Division~~

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UCX-163 (8-55)

This form for ~~Inter-Company Correspondence only~~

TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS

Date	Poplar Creek at East Fork Junction, ppb. Hg	K-891 Supply Water, ppb. Hg	K-901 Make-up Point, ppb. Hg
7-2-57	132	58	--
7-5-57	292	66	--
7-9-57	140	--	--
7-16-57	232	--	--
7-20-57	108	--	--
7-23-57	88	--	--
7-26-57	16	--	--
7-30-57	58	--	--
8-2-57	18	--	--
8-6-57	14	--	--
8-10-57	232	--	--
8-17-57	116	--	--
8-24-57	100	--	--
8-31-57	136	--	--
9-7-57	100	--	--
9-14-57	44	--	18
9-21-57	144	--	0
9-28-57	128	--	0

TABLE II

MERCURY CONTENT OF MONTHLY COMPOSITE SAMPLES

Month	Clinch River One Mile Downstream, ppb. Hg	Clinch River at K-1513 Pumphouse, ppb. Hg	Effluent From Water Purification Plant, ppb. Hg
July	0	0	0
August	0	0	0
September	0	0	0

TABLE III

MERCURY CONTENT OF SAMPLES FROM C, E, AND G LOOPS

Date	"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
7-2-57	44	72	76

INTER-COMPANY CORRESPONDENCE

UNION CARBIDE NUCLEAR COMPANY

A Division of Union Carbide and Carbon Corporation

[redacted]

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To: W. C. Hartman
K-1101

Plant: Oak Ridge Gaseous Diffusion

Date: October 7, 1957

Copies To:
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B. R. Webb
T. C. Whitson
Technical Division K-1005 File (RC)
Technical Division K-1401 File (RC)✓

Subject: Water Sampling Program for Mercury - July, August, and September, 1957

KLI-4236-1

K25 RC
NOT TO BE ... FROM PLANT RECORDS K-1034

Data on the mercury content of the Oak Ridge Gaseous Diffusion Plant area waters for the months of July, August, and September, 1957 are presented. Continuous semi-weekly samples were taken from the East Fork at the junction with Poplar Creek, at K-891 supply point, and at the K-901 make-up point. These results, expressed in parts per billion of mercury, are shown in table I.

In addition, analyses were made on monthly composite samples from the following points: Clinch River one mile downstream, Clinch River at K-1513 pumphouse, and the effluent from the water purification plant. These results are shown in table II. The results of monthly samples taken from the C, E, and G loops are shown in table III.

T. Kwasnoski for
T. C. Whitson

T. Kwasnoski
T. Kwasnoski
Laboratory Services Section
~~Special Analytical Services~~ Department

/evo

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This document has been approved for release to the public by: Gary W. Hollenbach ASQuist 7/21/95
Technical Information Officer Date
Oak Ridge K-25 Site

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Arvin S. Quist, Classification Officer
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E.W. McCaskill 3/9/93
(Person making change) (date)
Stephanie Milton 3/10/93
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WCX-163 (8-55)

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TABLE I

MERCURY CONTENT OF OAK RIDGE GASEOUS DIFFUSION PLANT AREA WATERS

Date	Poplar Creek at East Fork Junction, ppb. Hg	K-891 Supply Water, ppb. Hg	K-901 Make-up Point, ppb. Hg
7-2-57	132	58	--
7-5-57	292	66	--
7-9-57	140	--	--
7-16-57	232	--	--
7-20-57	108	--	--
7-23-57	88	--	--
7-26-57	16	--	--
7-30-57	58	--	--
8-2-57	18	--	--
8-6-57	14	--	--
8-10-57	232	--	--
8-17-57	116	--	--
8-24-57	100	--	--
8-31-57	136	--	--
9-7-57	100	--	--
9-14-57	44	--	18
9-21-57	144	--	0
9-28-57	128	--	0

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TABLE II

MERCURY CONTENT OF MONTHLY COMPOSITE SAMPLES

Month	Clinch River One Mile Downstream, ppb. Hg	Clinck River at K-1513 Pumphouse, ppb. Hg	Effluent From Water Purification Plant, ppb. Hg
July	0	0	0
August	0	0	0
September	0	0	0

TABLE III

MERCURY CONTENT OF SAMPLES FROM C, E, AND G LOOPS

Date	"C" Loop, ppb. Hg	"E" Loop, ppb. Hg	"G" Loop, ppb. Hg
7-2-57	44	72	76

INTER-COMPANY CORRESPONDENCE

Rep. No. 784

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(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

UNCLASSIFIED

TO K. M. Jones

LOCATION

ATTENTION

COPY TO

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Barton, J. C.
Fowlkes, C. C.
Kuehn, P. R.
Kwasnoski, T.
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Snyder, H. G. P.
Technical Division K-1005 Files (RC/RC) (4)
Technical Division K-1401 Files (K25RC)

DATE July 28, 1955

ANSWERING LETTER DATE

SUBJECT K-25 Area Water Survey

KLI - 3552

APPROVAL FOR RELEASE

Document: # KLI-3552 ; Date 7/28/55 ;
Title/Subject K-25 AREA WATER SURVEY, 9-page document, TKwasnoski to KM Jones.
Approval for unrestricted release of this document is authorized by the Oak Ridge K-25 Site Classification and Information Control Office, Martin Marietta Energy Systems, Inc., PO Box 2003, Oak Ridge, TN 37831-7307.

Virginia Dalton for Arvin Quist 8/3/93
K-25 Classification & Information Control Officer Date

A survey for mercury and manganese in Poplar Creek and Clinch River water has been made for a period of nine days in July to determine trends and daily variations in concentration. Additional chemical and spectrographic analyses have been made on the waters to show other contaminants.

Table I presents the results of the mercury analyses on Poplar Creek and Clinch River water.

Table II presents the results of the manganese analyses on the same samples.

Table III shows the mercury and manganese contents of miscellaneous samples submitted to the laboratory.

Table IV lists the control results obtained on the mercury method during the survey period.

Table V presents a complete analysis of Ohio River, Scioto River and Poplar Creek waters.

RESTRICTED DATA
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WCK-163 (3-51)

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(Person making change) (date)
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K-25 Area Water Survey July 28, 1955

Table VI presents the complete spectrographic analyses of the Poplar Creek samples taken on July 10, 1955.

Table VII lists the spectrographic analyses of miscellaneous water and solid samples taken in connection with the water sampling program.

T. Kwasnoski

T. Kwasnoski
Special Analysis Department
Works Laboratory

TK:gmu

TABLE I

MERCURY CONTENT (PPB.) OF K-25 AREA WATERS

Location	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/18	7/19	7/20
East Fork of Poplar Creek	156	128	56	86	264	800	34	----	82	0	----	----	----
Poplar Creek Above East Fork Junction	0	49	68	32	46	52	4	----	48	2	----	----	----
Raw Water at K-891	64	172	204	60	86	180	36	----	70	3	----	----	----
K-891 Effluent Treated Water	52	112	232	60	86	198	32	----	78	18	----	----	----
G Loop Supply	68	112	124	52	60	164	18	----	66	26	----	----	----
G Loop Return	68	118	120	48	50	144	96	----	12	22	----	----	----
Clinch River Below Poplar Creek Junction	0	49	44	32	46	124	104	----	60	22	----	----	----
Raw Water at K-1513	0	70	68	52	46	56	96	----	18	22	----	----	----
East End Y-12	---	132*	82*	--	248	264	118	618	----	---	294	4360	324
West End Y-12	----	528*	780*	--	41	39	46	176	----	---	50	32	42

*East end and West end samples are probably reversed.

TABLE II

MANGANESE CONTENT (PPM.) OF K-25 AREA WATERS

Location	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15	7/18	7/19	7/20
East Fork of Poplar Creek	0.12	0.12	0.11	0.18	0.15	0.08	0.11	----	0.15	0.18	----	----	----
Poplar Creek Above East Fork Junction	0.10	0.04	0.18	0.25	0.24	0.24	0.18	----	0.20	0.24	----	----	----
Raw Water at K-891	0.22	0.19	0.08	0.20	0.24	0.16	0.14	----	0.09	0.08	----	----	----
K-891 Effluent Treated Water	0.18	0.19	< 0.05	0.14	0.18	0.24	0.25	----	0.08	0.12	----	----	----
G Loop Supply	0.40	0.38	0.35	0.38	0.47	0.68	0.41	----	0.46	0.43	----	----	----
G Loop Return	0.40	0.38	0.35	0.39	0.40	0.66	0.42	----	0.46	0.37	----	----	----
Clinch River Below Poplar Creek Junction	0.12	0.09	< 0.05	0.08	0.11	0.19	0.05	----	0.04	0.03	----	----	----
Raw Water at K-1513	0.10	0.10	0.30	0.28	0.16	0.06	0.25	----	0.25	0.05	----	----	----
East End Y-12	----	0.10*	1.06*	----	0.12	0.09	----	0.10	----	----	0.05	0.08	0.11
West End Y-12	----	0.12*	0.28*	----	0.12	0.09	----	0.14	----	----	12.1	11.9	12.25

*East end and West end samples are probably reversed.

TABLE III

MISCELLANEOUS WATER SAMPLES ANALYZED FOR MERCURY AND MANGANESE

Location	Date	ppb. Hg	ppm. Mn
Drainage by A Tower	7/12	120	0.14
K-25 Drainage	7/12	88	0.26
K-1410 Drainage	7/12	80	0.18
K-131 Drainage	7/12	104	0.06
K-631 Chem. Pit	7/12	88	2.75
C Tower West Drain	7/12	112	0.28
K-27 Sewage Drain	7/12	76	0.11
Dilution of Drainage Before Clinch Dilution	7/12	68	0.08
K-1131	7/12	168	0.42
1300 Holding Pond	7/12	184	0.22
Zeolite Wash Water G Loop	7/12	304	5.9
Clinch River at Flying Saucer	*	10	
Blank	7/12	10	
Blank + 200 micrograms Cu + 500 micrograms Pb	7/12	10	
Spike (50 micrograms Hg) + 200 micrograms Cu + 500 micrograms Pb	7/12	52	
Sample 301 (J. C. Barton)	7/11	40 38	
Sample 302 (J. C. Barton)	7/18	12 12	
Sample 303 (J. C. Barton)	7/20	0 0	
Sanitary Water K-1004-D	7/12	18	

*Approximately January 1955.

TABLE IV

MERCURY CONTROLS (50 PPB. Hg)

Date	ppb. Hg
7/11	50
7/12	52
7/14	56
7/18	50
7/19	52 56
7/20	56 58
7/21	59 56

TABLE V

ANALYSES OF WATER FROM THREE DIFFUSION PLANT AREAS

Analysis	Units	Ohio River 7/12/55	Scioto River 7/15/55	Poplar Creek 7/18/55
pH		7.4	7.4	7.5
Conductivity	micromho	265	468	298
Manganese	ppm.	0.15	0.12	0.16*
Mercury	ppb.	48	20	97**
Iron	ppm.	0.16	0.4	0.19
Silica - Total	ppm.	0.8	11	11
Dissolved	ppm.	0.4		
Calcium	ppm.	31	52	27
Magnesium	ppm.	10	25	10
Hardness	ppm. as $CaCO_3$	118	232	108
Alkalinity: P	ppm. as $CaCO_3$	0	0	0
Alkalinity: M	ppm. as $CaCO_3$	62	158	72
Suspended Solids	ppm.	54	91	17
Dissolved Solids	ppm.	132	339	188
Chloride	ppm. as NaCl	13	44	32
Sulfate	ppm.	39	51	54

* Nine day average of K-891 Raw Water Samples from Table II

** Nine day average of K-891 Raw Water Samples from Table I

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TABLE VI

SPECTROGRAPHIC ANALYSES OF POPLAR CREEK SAMPLES TAKEN JULY 10, 1955
(Results Reported in Parts Per Million)

Element	East Fork of Poplar Creek	Poplar Creek above East Fork	Raw Water at K-891	K-891 Effluent Treated Water	G Loop Supply	G Loop Return	Clinch River Below Poplar Creek Junction	Raw Water at K-1513
Al	2	10	10	1	1	2	0.6	1
Ca	100	20	60	40	160	200	20	60
Cr	----	---	----	----	----	1	----	----
Cu	0.1	0.1	0.1	0.1	0.2	0.6	0.2	0.1
Fe	2	10	10	2	6	10	1	2
Li	6	----	6	2	20	20	----	----
Mg	20	20	20	20	100	100	10	15
Mn	----	0.8	0.4	0.2	1	2	----	0.2
Na	40	----	20	10	60	60	----	----
Si	6	40	20	2	20	20	2	6
Ti	----	1	1	----	----	----	----	----

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TABLE VII

SPECTROGRAPHIC ANALYSES OF MISCELLANEOUS WATER AND SOLID SAMPLES
(Results Reported in Parts Per Million on Water)

	East Fork Junction of Poplar Creek					Coal Creek	
Element	7/1	7/2	7/3	7/4	7/6	Water 7/5	Dust, % 7/5
Al	3	2	3	3	1	50	1
B							0.01
Ca	50	50	50	50	20	125	0.3
Cu	0.1	0.1	0.1	0.05	0.04	0.3	0.006
Fe	1	1	1	0.5	0.5	50	1
Li	2	1	2	10	1	----	
Mg	5	5	5	5	6	50	0.2
Mn	0.5	0.4	0.4	0.2	0.2	25	0.02
Na	5	3	5	30	5	20	----
Ni	0.5	0.3	----	0.2	----	2	----
Pb	2	2	1	3	----	----	----
Si	5	5	5	5	2	20	2
Ti	0.1	0.1	0.1	0.1	0.04	----	0.2
V	----	----	----	----	----	----	0.02